WINTER 1960—1961

Bell Telephone Magazine

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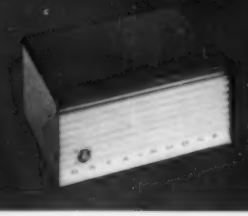
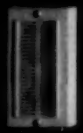
- New Liberalism vs. The Freedom to Choose
- The Gold Problem

SPECIAL INSERT:

- Our New Customer Products and Services





VOLUME XXXIX NUMBER FOUR WINTER 1960-61

BELL TELEPHONE MAGAZINE

A non-technical review, published quarterly to give Bell System management people a broader view of the history, objectives, operations, and achievements of this business than they might attain in the course of their day-to-day occupations, and an added sense of participation in the problems and accomplishments of our nation-wide public service.

COVER: This geometric pattern incorporating some of our new products was designed by William Panos, A. T. & T. staff artist.

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A MEDIUM OF SUGGESTION and A RECORD OF PROGRESS

GEORGE B. TURRELL, JR., *Editor* SALVATORE J. TAIBBI, *Art Editor*

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Working *in faraway places, the men who constructed the Mercury ground stations used all kinds of transportation. This man comes to work on a camel on Grand Canary Island.*

America's man-in-space project will use a global tracking and communications network engineered and built under Bell System leadership

The Bell System's Role in Project Mercury

R. M. Goetchius, *Manager, Project Mercury*
WESTERN ELECTRIC COMPANY

DR. T. KEITH GLENNAN, former administrator of the National Aeronautics and Space Administration, stated on a recent television program that his agency hopes to put the first American in orbital space flight some time in 1961 —"at least in the last half of the year," to quote Dr. Glennan's own words.

The effort to which he refers is known as Project Mercury. This is our government's attempt to send a man, sealed in a metal capsule, on three orbital trips around the globe, and then bring him safely back to earth.

Hurled into space from the nose of a booster rocket to be launched at Cape Canaveral, Florida, the Mercury astronaut is expected to circle our planet at a height of about 120 miles and a speed approximating 17,000 miles per hour. Each of his orbital trips should take about 90 minutes to complete. At the end of its four and a half hour journey, the Mercury vehicle will be directed back into the earth's gravitational field for an ocean landing and recovery between the Bahama Islands and Puerto Rico.

The safe flight of a manned vehicle in space obviously rests upon the successful solution of many scientific and engineering problems. Among these, the design of the space capsule and equipment and techniques for its launching and recovery are of great importance. And hardly less important is the system of communications by which men on the ground can track and monitor the capsule's flight, transmit command signals from earth to the

Project *Mercury Control Center at Cape Canaveral, Florida, which is in instantaneous contact with the globe-girdling ground stations through the Goddard Space Flight Center.*

vehicle's operating instruments, obtain data on its performance in space, and talk to the astronaut by radio while he orbits the globe.

Mercury's Ground Network

Soon a new world-wide tracking and communications network, developed and built especially for Project Mercury under Bell System leadership, will be completed and turned over to the government. Mercury's ground network is a globe-girdling chain of stations linked to Cape Canaveral through the Goddard Space Flight Center near Washington, D. C. It is one of the most extensive communications projects ever undertaken. Virtually all types of modern communications are employed in it—radio and radar, telemetry, telephone and Teletype, automatic data transmission. Leased land lines and overseas radio and cable facilities from as many as 20 private and public communications services throughout the world are an integral part of the system. The cooperation of eight national governments is involved. Upon completion early in 1961, the Mercury network will provide a single communications belt surrounding the earth in a 30,000-mile circle, spanning the continents of North America, Africa, and Australia, as well as the Atlantic, Indian, and Pacific oceans.

The Network's Builders

Western Electric. Design and construction of this unusual tracking and communications system have been the responsibility of the Western Electric Company as leader of an industrial team brought together especially for the purpose. Other members of the group are Bell Telephone Laboratories, Bendix Corporation, International Business Machines, and Burns & Roe. In addition, personnel recruited by Western Electric from almost all of the Associated Bell Telephone Companies have participated.

Beginning about a year and a half

ago, construction of the Mercury network has proceeded as scheduled toward an operational date in February, 1961. Western Electric now expects to turn the completed system over to the government some time between February 1 and April 1, after periods of operational training and technical monitoring have been finished at all the Mercury sites.

At that time, the W.E.-led team will have established operating facilities for the project in 19 locations around the globe. Six of these sites are on islands in the Atlantic and Pacific—the Bahamas, Bermuda, the Canaries, Canton Island, and Hawaii; two are on specially-equipped ships in the Atlantic and Indian oceans; two sites are in Africa, two in Australia, one in Mexico; and six—including the Goddard Space Flight Center—are located in the continental United States. In readying these stations for NASA's use, Western Electric has provided over-all management of the project, has engineered the ground communications system, and has been in charge of transportation and supply operations, as well as training of NASA's operating and maintenance personnel.

Bell Laboratories. Providing engineering consultation for the Mercury network, Bell Telephone Laboratories is responsible for the design of command and control equipment required to inform NASA's ground-based operations director what he will need to know in directing the space-flight. This equipment has been installed at Mercury's main ground station—Cape Canaveral—and at an auxiliary control site in Bermuda.

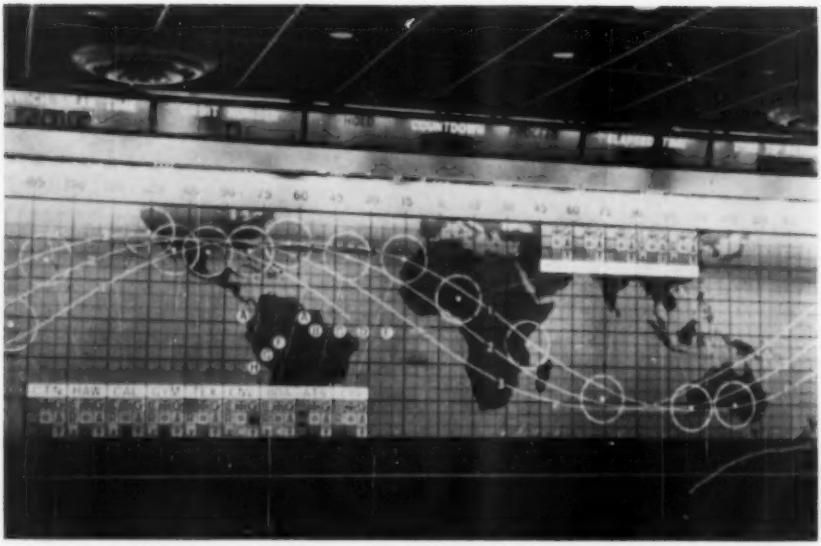
Bendix. Provision of radar, telemetry, and ground-to-air communications for the network has been the task of the Bendix Corporation. For automatic tracking of the space capsule, two types of radars operating on different frequency bands are being used—a medium range, precision radar and a very long range tracking radar. The Mercury vehicle's speed and position while in orbit are among other important facts these radars will supply to men on the ground.

Telemetry equipment will be used for automatic sending and receiving of quantitative information between the space capsule and the earth. Information about the spaceman's physical condition, the behavior of the capsule's life-support system, and other data pertaining to life in space will be obtained by telemetry.

Ground-based radio antennas will transmit command signals from earth to the high-flying vehicle and will provide both high-frequency and ultra-high-frequency voice communications.

IBM. International Business Machines Corporation has developed the Mercury network's complex system of computers and computer program, established at the Goddard Center and the site in Bermuda. IBM has also furnished the equipment for thorough testing of the project's computational system. High-speed processing of data by these machines, as well as its rapid transmission from Mercury's far-flung sites to the Canaveral Control Center, are essential prerequisites to the operations director's decisions in guiding the space-voyage.

Burns and Roe. The tasks of siting, construction and provision of site facilities were assigned to this New York construction firm. After sites were chosen, Burns and Roe's round-the-world job involved the construction of a total of 36 new buildings—seven control or main buildings, 11 power buildings, and 18 miscellaneous struc-



Orbital *world map is seen on the wall of the Project Mercury Control Center at Cape Canaveral, Florida. Circles indicate locations of ground station sites set up around the globe.*

tures. Eighty-one new towers and antennas for radar, telemetry, and radio communications were erected.

Construction work of this sort employed local personnel and local general contractors wherever feasible. Use of already-existing facilities for tracking and communications was emphasized throughout the project, eliminating wasteful duplications and keeping the amount of necessary new expenditures to a minimum.

Mercury Communications

Engineering and providing the Mercury network's system of ground communications was a special job of Western Electric, working jointly with A. T. & T., the Associated Telephone Companies of the Bell System, and many other communications companies around the world. In developing the means by which Mercury's ground stations can keep continuously informed of all facts necessary to the spaceman's successful flight, W. E. has provided a communications complex fully integrated for rapid and effective operation on a world-wide scale. It is made up of the following components:

• *Leased Facilities.* From telephone, telegraph, and radio companies or government services throughout the world, more than 150,000 circuit miles of communications facilities have been leased for the Mercury project. These will interconnect Mercury's site locations and will provide appropriate circuits for telephone calls, Teletype messages, radio links, and high-speed electronic data transmission. Among

Special *4-wire switchboard which is the heart of "SCAMA"—switching conference and monitoring board—which permits up to nine remote stations to confer simultaneously with Cape Canaveral is demonstrated above by C. J. Goodman of Western Electric, E. P. Ritchie of C. & P., Washington, H. E. Traviss of the Long Lines Department of A. T. & T.*

Kano, *Nigeria ground station during the construction phase. A native crew is improving the grounds in front of the almost completed Project Mercury telemetry building.*

the 20 common carriers providing leased facilities are RCA Communications, the British Post Office, Cable & Wireless, Ltd., Transradio Español, Telefonos de Mexico, and Australia's Overseas Telecommunications Commission.

• *Switching Conference and Monitoring Arrangement.* At the Goddard Center, a new, specially-designed switchboard will make it possible for Mercury's operating personnel to participate in round-the-world telephone conferences. Developed for the purpose by the Long Lines Department of A. T. & T., the new board permits as many as nine far-flung telephone positions to be in conference at once

Site *on top of Tranquillon Mountain near Port Arguello, California, which will be used for tracking and communications.*

with Mercury officials at Cape Canaveral. This so-called "SCAMA" board also achieves a great reduction in the transmission noise that might otherwise be expected among so many diverse and distant locations.

• *Integrated Teletypewriter System.* Mercury ground stations will continuously send and receive data on the progress of the spaceman's flight by means of an interlinking Teletype communications system. Tracking data will be fed by teletypewriter into the IBM computer at Goddard, coming in at six-second intervals from the field stations following the capsule's orbit. The transistorized computer will process this information and convert it for various uses. Among these will be the sending of Teletype data from Goddard to the next site in line with the capsule's motion, thus enabling men on the ground to be constantly prepared for the space vehicle's appearance overhead.

• *Data Transmission Service.* The

Construction *men (below) are seen using a tension gauge to check a guy wire supporting a radar boresight tower located at the White Sands, New Mexico, Mercury ground station.*

Coopers Island, *Bermuda, Mercury site, showing the main building framed by telemetry antennas. The power building is at the right; very long range tracking radar is at the far left.*

Goddard computer installation will also process incoming data for high-speed electronic transmission to the Control Center at Cape Canaveral. Making use of Bell System data transmission circuits, information essential to various phases of the orbital journey —launching, overhead passes, return into the earth's atmosphere—will flow back and forth between Goddard and Canaveral almost instantaneously. During the launch phase, for example, the transmission and processing of thousands upon thousands of electronic facts will occur so fast that Canaveral's antennas, picking up impulses from the spaceborne capsule, will relay them to the Goddard computer near Washington and back to the Canaveral control room in scarcely

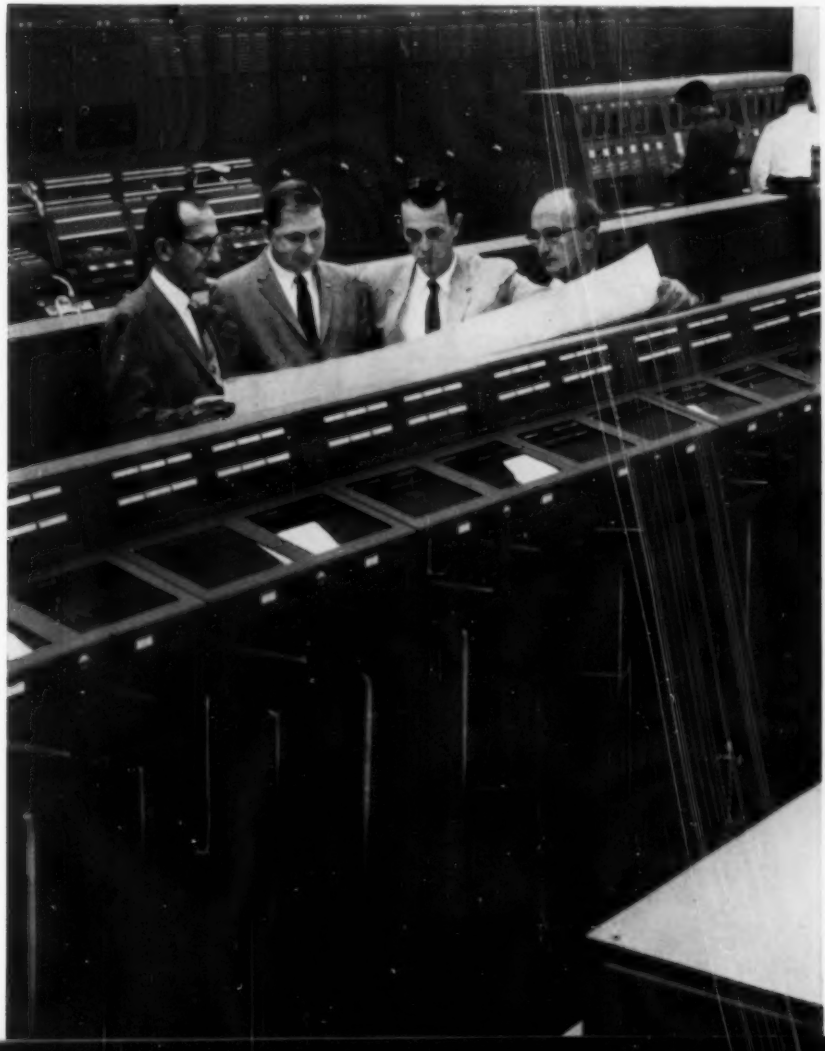
more time than it takes to blink an eye.

• *Intrasite Communications.* Local exchanges, using Western Electric PBX and key telephone equipment, have been installed as needed at Mercury stations to provide telephone extension links between the various buildings, rooms, and ground areas for rapid communication among operating and maintenance personnel. Each local exchange also incorporates radio and Teletype message channels and is linked by appropriate lines with Goddard and Cape Canaveral.

Built in Safety

Mercury's ground communications system, like all other elements in its global station network, has been equipped with every possible safety factor and every means of assuring operational integrity. Components of the most advanced design, maximum safety margins, duplicate parts wher-

Part of Project *Mercury's Integrated Teletypewriter System located at the Goddard Space Flight Center, Beltsville, Maryland is seen during installation in the view below.*



ever needed, and monitoring and display facilities to verify correct operation—all these have been engineered and built into this unique tracking and communications complex. It is backed by years of Western Electric and Bell System experience in communications, as well as the experience and ability of Bendix, IBM, and Burns and Roe in their various fields.

And soon, Project Mercury's ground network will be completed and turned over to the government, ready to play its important role in NASA's careful preparations for a venture of major significance into space.

Muchea *ground station is located in the sandy scrub country of Western Australia.*

Still in its infancy, this swift and versatile service is already bringing greater efficiency, big savings to our customers and new revenue to us. Its future is almost limitless but we must be alert and aggressive to make the most of its potential

It's Data-Phone in 1961!

Harvey J. McMains, *Administrator, Data Communications Planning*
MARKETING DEPARTMENT, A. T. & T. CO.

THROUGHOUT the Bell System, 1,200 salesmen are completing intensive training in the principle and application of a revolutionary communications system. Full-scale marketing presentations have been made to all Associated Companies and a new section of the Marketing Department has been established at A. T. & T. to coordinate and aid field activity. An aggressive marketing program supported by widespread promotional activity is focusing emphasis on a new communications service which may well be the greatest development since the basic telephone.

Clearly, in 1961, the word throughout the Bell System is Data-Phone! This service, which provides a means of using the already existing Bell System switching network to permit machines to "talk" to machines, came out of the Bell Laboratories in 1958. Since the very beginning it has given promise of being a most remarkable and far reaching contribution to the art of communications. Now, as it enters the second phase of its brief but spectacular career — market development — that promise is coming true.

The marketing challenge and opportunity of Data-Phone demands that we be aggressive and alert to avail ourselves of this promise. The important first step is to help our customers solve their *existing* communications problems with the services our present line of Data-Phones now provides, rather than go "exploring" for new uses which may call for Data-Phone developments not yet in existence. It may be more

dramatic to find new applications, but actually we can serve our customers far better by supplying the many immediate needs our present service can satisfy. There are more than enough such opportunities to keep us busy for a long time.

Though still in its infancy, Data-Phone service is one of the fastest growing and most rewarding markets for the Bell System today. In the first two years that Data-Phone has been available on a limited basis, approximately 1,000 sets have been installed. In 1961, however, 6,000 sets are expected to be in use and the forecasts indicate as many as 100,000 by 1965!

The business potential of Data-Phone can best be realized by considering that conversation between machines over the regular telephone network may equal or even surpass the volume of voice communications in the not too distant future! But, even though data processing by telephone may double the use of our message network, it will not require the expense of greatly expanded facilities.

'Tomorrow' Comes Closer

Writing on early Data-Phone developments in the Autumn 1959 issue of

Stage show *dramatizing Data-Phone's capabilities opened at "195," later went on tour of the Operating Companies. Here Robert E. Hess, A. T. & T. Marketing, makes call . . .*

this magazine, John H. Craig, then A. T. & T. private line and TWX engineer, emphasized that: "The world of tomorrow can easily be characterized as one dominated by data processing and communications—increasing in volume and speed as the years go by."

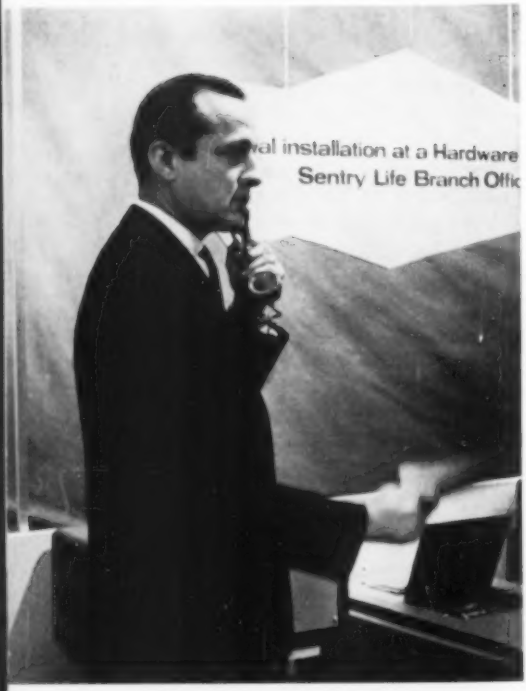
The Bell System has taken the country one giant step closer to that world of tomorrow as the data processing and transmission field continues to expand beyond prediction.

Hardly a month passes without the announcement that another manufacturer has produced a type of equipment that will function with Data-Phone. A whole new horizon for business machine manufacturers is developing rapidly because of the increased applications of Data-Phone that Bell System sales people have helped to find.

By giving new dimensions to electronic computers, Data-Phone has also helped to bring a rapid expansion in data processing as well as in transmission. Now, many locations can share the use of a single centralized computer via Data-Phone.

Since the delivery six years ago of the first large scale business office computer, the industry's annual volume has

...Call from Mr. Hess is received across stage by Mrs. Dorothy E. Matase of New York Company. After connection is made business machines do the talking via Data-Phone.



Value *of Data-Phone in the handling of policies and customer payments was described by Raymond Deck, vice president of Hardware Mutuals-Sentry Life during joint press conference with Bell System.*

mushroomed to nearly one billion dollars—and by 1965 it will approach two-and-a-half billion dollars according to an RCA estimate.

IBM feels so confident about the future of communications-based data processing that it has a company-wide program to assure the marketing of systems to fit every potential application.

Friden, Digitronics, Teleregister, Comptometer Corp., Burroughs, Talley Register, Minneapolis-Honeywell and many other business machine manufacturers are also excited over the prospects and either already have or are now planning to produce equipment which can be used over the switched message network via Data-Phone.

Data-Phone is the key link of a multi-million dollar data processing system recently completed for the Hardware Mutuals—Sentry Life insurance group. In this customer application, which is the largest of its kind to date, Data-Phone enables Hardware Mutuals to gain full utilization with maximum speed from a complex of IBM data processing machinery.

Faster Service plus $1 Million Savings

Speaking at a joint press conference with the Bell System last fall, James P. Jacobs, president of the insurance firm, stated: "Our new arrangements for transmitting and processing insurance data in a fraction of the time previously required will enable us to greatly speed policy holder service, reduce operation costs by more than $1,000,000 annually and effect an important increase in investment income."

Here is a case where a young, alert salesman in the Wisconsin Company recognized that Data-Phone could best solve the data transmission problems of the insurance company. Typical of the new brand of Data-Phone sales engineers, Lee A. Destache took his customer from Stevens Point, Wisconsin, to Akron, Ohio, to inspect an earlier Data-Phone installation and to observe the overwhelming advantages of utilizing the existing telephone network for data transmission. His aggressive salesmanship is bringing in close to a quarter of a million dollars annually in revenue. This is the kind of salesmanship that will keep Data-Phone in the minds of American businessmen. This, too, is the kind of aggressive marketing that we must have if we are to get our fair

share of the competitive data communication market in the years ahead.

Lee Destache found, as we all know, that Data-Phone will not automatically sell itself. A concentrated effort at all levels is required if the Bell System and its customers are to realize fully the benefits of this system.

We must thoroughly understand and appreciate this revolutionary concept of machine communication and promote its applications while striving to develop new ways that Data-Phone can provide service.

Now, with four basic Data-Phone models available to fulfill varying requirements, we can offer custom service not only to meet but to anticipate the needs of a broad spectrum of our business customers.

Currently, many forms of machine data, in a variety of machine languages, can be transmitted via Data-Phone at controlled speeds ranging from 100 to 1,600 words a minute; or, from 75 to 1,200 "bits" a second. Speeds of up to a million and a half bits per second are now foreseen. Even now the possibility of developing compatible equipment to operate at such speeds is under study by several business machine firms.

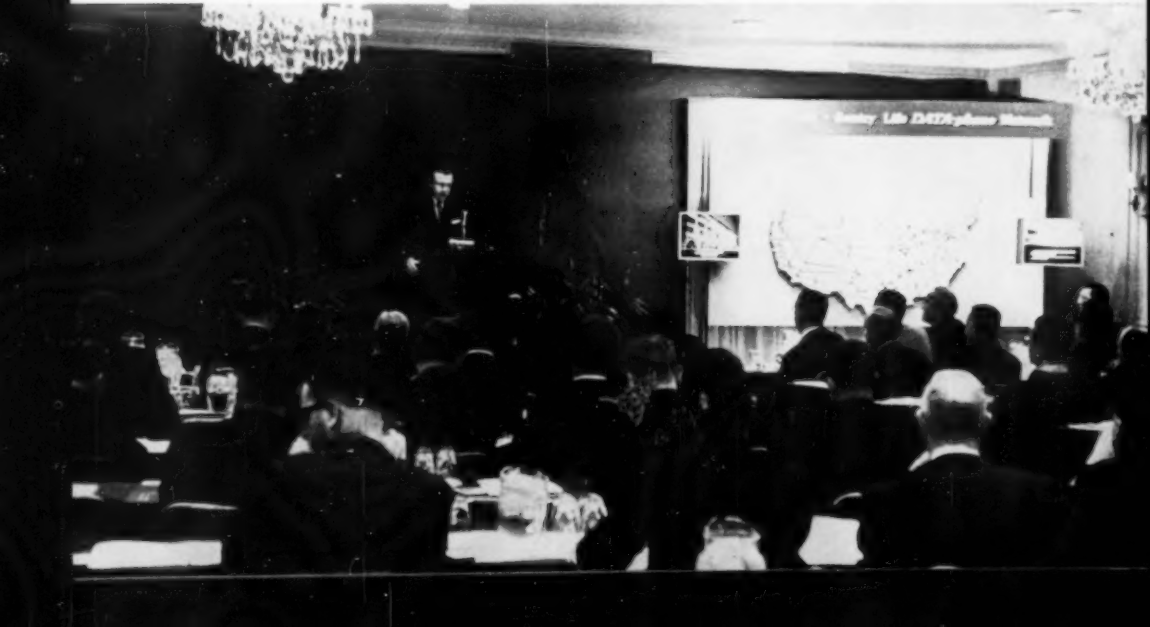
Later this year the 1,000 word-per-minute teletypewriter, or Dataspeed, will be introduced along with a commercial model of the Bell-pioneered card reader. These additions will expand even further the uses for Data-Phone transmission.

Every One Benefits

It is highly significant that an unsatisfied Data-Phone customer is almost impossible to find. Dollar-savings are being reported by many other Data-Phone customers throughout the country. But equally as important is the greatly increased efficiency and significant reduction in time that the use of Data-Phone makes possible.

Firestone of Akron first tried Data-Phone to send payroll information from its Los Angeles office. This was so successful, additional installations have been made for Firestone in Atlanta, Kansas City and Dallas. Now, other accounting data besides payroll information are being handled faster and more efficiently.

Million dollar *savings through better processing and transmission of data was reported by Hardware Mutuals President Jacobs at press conference held jointly with Bell System.*



In another application, the American Savings and Loan of Detroit has superseded slow, costly and sometimes unreliable motorized messengers with Data-Phone. Now, daily teller transactions in each of six branches are recorded on window posting machines which produce punched paper tape as a by-product. Friden Tele-data machines then read the tapes and Data-Phone transmits the information directly to headquarters where it is converted to punched cards for use in electronic computers to balance the day's transactions. A simple telephone call is all that is needed to connect the branch office Data-Phone with the one at headquarters.

United Airlines is installing a fully automatic Teleregister airlines reservations system. Some 11 locations will be connected by private lines. At these locations the airline reservation attendants' sets connected to Data-Phone will be able to interrogate a centralized computer that stores information on all flights. Reservation information can be obtained in this way in a mere matter of seconds.

A long list of such satisfied customers and versatile applications of Data-Phone installations extends through a multitude of general and specialized businesses where the telephone has found a new way to be of service. And, in almost every case on record, Data-

How Data-Phone Helps Speed Data Processing

Clerk in branch office (left) screens auto insurance application. Key punch operator records data on punch card. Data will be sent via Data-Phone over telephone to . . .

Phone has not only paid for itself but also produced both savings and increased efficiency.

Flexibility, simplicity, a wide range of speeds and low cost of operation are the four main features of Data-Phone service. This new equipment can tie many existing business machines into ordinary telephone circuits, permitting a choice of any one of 73 million telephone locations in the U. S. The customer pays for the line only as he uses it—just like a conventional voice call and at the same rate.

Data-Phone sets are designed to work over private line facilities also, or a combination of private line and the regular telephone network. Unattended operation is also possible. A call can be made to an unattended distant Data-Phone set which automatically answers itself and connects the business machine. Once the call is made, machines can complete the transmission of data unattended and hang up when the call has been completed. It will soon be possible to both originate and complete calls automatically.

Whether a customer's communications problems lie in the field of accounting, administration, credit and collections, finance, insurance premiums, inventory, marketing, merchandising, payrolls, production purchasing, sales scheduling, shipping or in any other area, Data-Phone more often

At Hardware Mutuals-Sentry Life *(continued on next page)*

Data processing center where punch cards are duplicated instantly by an IBM Transceiver from electrical impulses received over telephone by Data-Phone.

than not is the best answer.

If Data-Phone is properly marketed by us, this boon to our customers will lead to new heights of growth and development because Data-Phone business will be revenue in addition to voice business.

The data transmission market is truly an exploding one. If we go after it energetically it will remain our market and the Bell System will benefit along with its customers. Our competitors won't be asleep, but neither will we.

Data-Phone Helps Speed Data Processing . . . *(continued from page 19)*

Cards containing information transmitted from branch office are fed into IBM computer.

Policy declaration is produced by high-speed printer from computer punch cards.

Paper work vanishes. Girl carries tape storage reels equal to 32 file sections.

Sample of tape held in hand has same data as standard punch card.

What would happen if some of the new liberal economic theories were actually put into practice? A noted economist points to some serious pitfalls

The New Liberalism vs. The Freedom to Choose

Warren W. Shearer, *Ph.D., Professor of Economics*
WABASH COLLEGE

Do Americans enjoy the highest level of living in the world in the midst of a public slum? Do we emphasize private production and neglect public production at risk to our national defense and to our continued growth? Harvard economist John K. Galbraith appears to answer these and other questions of a similar nature with a resounding "yes" in *The Affluent Society* published two years ago.

According to Galbraith we have more automobiles, more television sets, more refrigerators, better housing (and more of it per family), more food (and a greater variety), indeed, more of all forms of private wealth than any other people. Yet our schools are overcrowded, our highways and hospitals inadequate, and our public servants underpaid. Periodically, we demonstrate that we have enough of some of these private goods, stop buying more, and slide into a recession that reduces the overall rate of growth in our economy. Thus by over-emphasizing private consumption and production we create a situation of social imbalance and tend to fall behind our maximum attainable rates of growth.

To solve these problems he urges a higher level of government spending and higher taxes to meet the costs. Such expenditures, he urges, will correct social imbalance, will not be subject to the same sort of fluctuation that

affects private spending and so will serve to stabilize the economy. Put in this fashion, the argument sounds plausible. Put it another way and one is not so sure.

Suppose someone were to propose that the government decide just what is to be produced and how much; that John Jones find fewer and fewer opportunities for a job in private industry and that his income be spent (to an even greater extent than it is now) on goods which he does not want but which someone has decided would be good for him. This, it should be understood, is exactly what a tax does. Such a proposal would receive scant attention and be overwhelmingly rejected by Americans, even if it promised a greater growth rate, even if it promised more *real* material welfare. Let it be clearly understood: this is not what Galbraith proposes, but it is the direction in which his proposals tend.

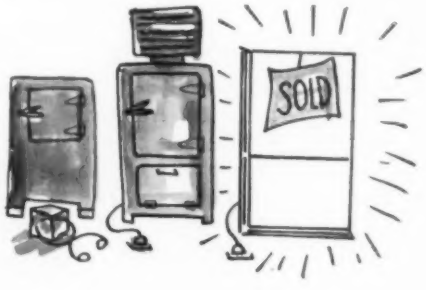
"*New Liberalism*"

Nevertheless, his basic approach is one which enjoys increasing acceptance in the United States. It may be called, for the sake of convenience, the "new liberalism." Two problems confront us. One is to discover why the new liberalism is so appealing and the other to analyze just where its acceptance is likely to lead.

Perhaps the best explanation for its popularity is that the theory of social imbalance has a basis in fact. Everyone is aware that in many areas we do need more schools and hospitals, better roads, etc. Furthermore we are constantly aware that from time to time the economy does slow down, there is unemployment, and we would like to grow more rapidly. Given this general awareness of the situation many people are likely to accept at face value any solution which has even a surface attractiveness. Since the new liberals turn in the direction of federal (as opposed to state and local) government for their solutions, they are in tune with the trends of the last 30 years and their proposals appear to be no major departure from the present. Out of conditions such as these, popular fallacies are most likely to emerge.

How Free Markets Operate

In order to understand clearly what the new liberals are saying it is necessary to understand the basic principles behind the operation of free markets. Individuals receive incomes from work or ownership of property; part of these incomes are taken by taxes to provide public services and the balance is distributed between the purchase of consumption goods (or services) and savings. If a person decides that he needs (or wants) a new electric refrigerator then (given the necessary dollar votes) he makes the purchase. If people in large enough numbers want refrigerators those who manufacture them show a profit and proceed to make more. If people feel that they no longer need (or want) new refrigerators in the same quantities as they did before, the manufacturer is likely to lose money and will certainly turn his facilities to making new products, or perhaps to making refrigerators more attractive.



The Government's Role

With the funds taken in taxes, government provides for the national defense, public schools and other forms of activity that are essential to a complex society and cannot be provided by private enterprise. Much of what the government spends is, of course, directed back into the market economy through the purchase of goods and services from private enterprise. The last few years have seen a substantial increase in the proportions of total output determined by government (political) action—largely as a result of the demands of the Cold War but in part—especially at state and local levels—by demands for new schools and other public services. It is this proportion which the new liberals wish to increase at the expense of the private expenditure sector. In other words, they call for a political decision which will force John Jones (whether he agrees or not) to purchase more public goods and fewer private goods. Furthermore, the clear implication is that this decision should be reached at the national level rather than at the state or local levels.

The Proper Distribution of Power

To this argument, there are three basic objections. All of them are economic; all of them also involve judgments about the proper distribution of power within a free society. In the first place, the implied shift from state and local to federal responsibility runs the serious danger that the federal framework of government may be distorted. The argument is seldom made that states and local communities cannot do the needed job—rather it is claimed that it is easier for the federal government to tax. The record number of new classrooms built over the last eight years—without federal aid—and the increasing level of salaries for teachers (as well as public officials) demonstrates that where there is local determination to see education improved, the job can be done.

The High Cost of Federal Aid

Sometimes the argument is heard that the costs are too great to be borne by the local community and that federal aid is a necessity. The author has personally experienced this argument coming from a person who failed to recognize that the impact of federal taxation would inevitably result in forty per cent heavier taxes than if the financial cost of the local needs were met at home. It is true that some local-

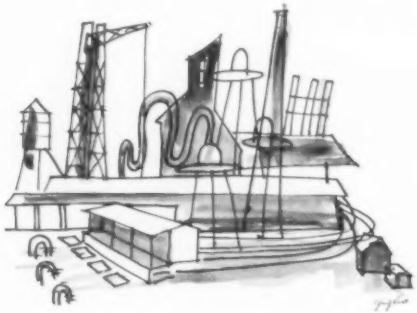
ities would benefit, but the infrequency with which people recognize that they pay federal taxes to meet these costs is good evidence that the provision of public services via the federal aid route tends to exaggerate the benefits and minimize the costs of such expenditures. There is a clear presumption that public needs in Crawfordsville are better assessed by those who live in Crawfordsville than those who live in Indianapolis or Washington. If this is granted, then there is an equal presumption that

the responsibility for meeting those needs should rest as close to home as conditions permit.

Problems of Growth and Unemployment

Secondly, there is substantial evidence that the new liberals have not thought through the problems of growth and unemployment. By diverting production from the private to the public sectors of the economy, the immediate impact would be to further reduce employment in those areas in which unemployment already exists, e.g., steel, automobiles, electric appliances, etc., and to increase the pressures in those areas in which unemployment is at a minimum, notably construction. The net effect of such a shift would be to create inflationary pressures in one segment of the economy while creating more unemployment in others—which would in turn provide the argument for still further shifts of production from private to public goods.

As far as growth is concerned—if the argument is pushed beyond the cyclical downturns which reduce output temporarily—the evidence is overwhelming that rates of growth are proportional to the amounts of new capital equipment that are created. Since World War II American corporations have spent more than $300 billion in improving and enlarging their plant and equipment. To strike at the earnings which have supported this growth would be to insure that the future would see less such building.



Personal incomes after taxes (in spite of increases in the latter) have risen in real terms by more than 45 per cent in the last ten years. Per capita incomes have risen by 25 per cent in spite of a rapidly expanding population. Such rates of increase have been made possible only by increased productivity resulting from new investment. These are not grounds for complacency, but they bring into serious question the complaints of the new liberals that the economy has performed badly.

It is safe to assume that since these increases represent additions to welfare that have been at the disposal of John Jones—all of us in fact—the total satisfaction derived from them is vastly greater than had these increases been smaller and another set of goods been substituted for those John Jones actually bought. If the new liberals are prepared to deny that John Jones is the best judge of his own well being, then they are equally prepared to deny the basis for a free democratic society. These arguments cannot be proved to be right or wrong in any statistical sense. But they have all the greater weight because they bear on things which free men intuitively *know*.

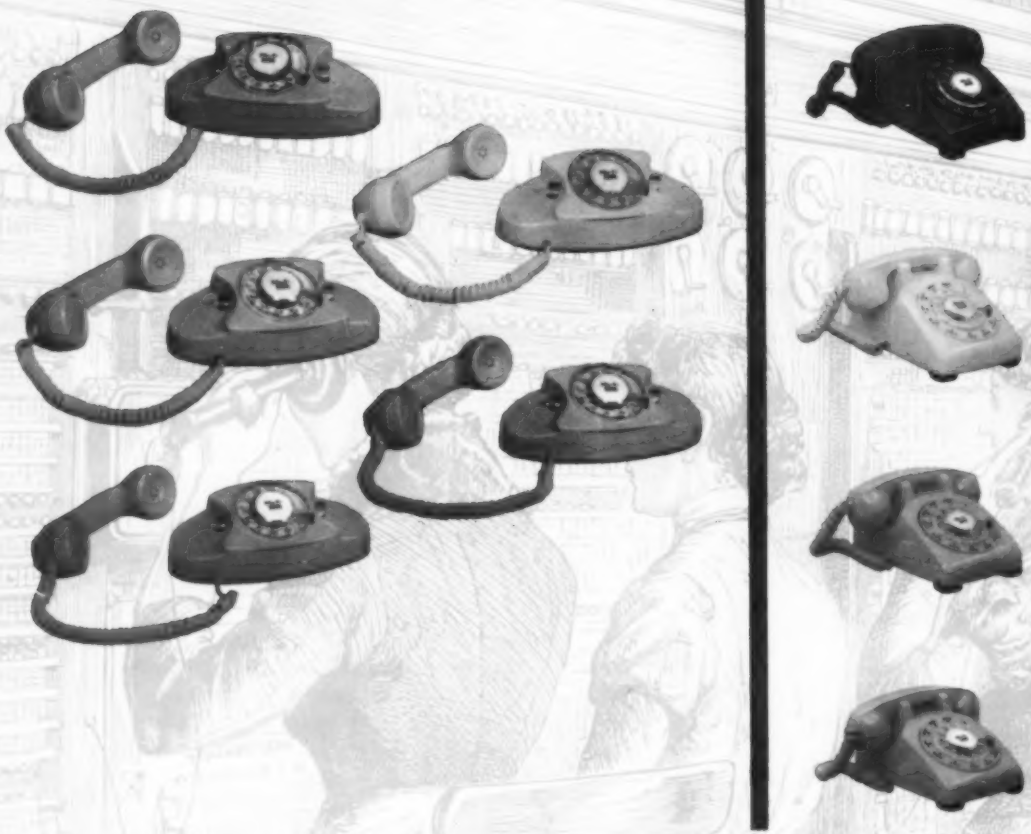
How Much Coercion?

Finally, we must consider the relationship of our economic organization to our political organization. It is accepted by all save a handful in the United States that the purpose of a free society is to preserve individuals from the coercion that others might seek to impose on them. It is of little importance whether that coercion be of a

public or private nature. To the extent that we are coerced we are no longer free. Yet it is obvious that we do—and must—submit willingly to some forms of coercion. The government must have the power to levy taxes if it is to command resources to provide for our national defense. On the other hand, private individuals must have the power to deliver or withhold those resources which they command, thus the right of labor to strike even when such a strike seems foolish. This is an instance of controlled and limited coercion; only government possesses the power of unlimited coercion—and by our Constitution and Bill of Rights we carefully hedge even government power.

Now, if the proportion of our total output that is under the control of hundreds of thousands of individuals and firms remains large, the power to coerce held by any one of these individuals or firms must be relatively small. As the proportion of output subject to political decisions becomes larger, there must inevitably be a growth in the power to coerce. No matter how wisely, no matter how benevolently exercised, political decisions remain essentially of a coercive nature. In economic terms, coercion results in forcing someone to accept a less satisfying course of action than he would have followed in the absence of coercion. In ethical terms, coercion results in denying to individuals their right to individuality. And both of these results may be called evil. Some evils we must accept—perfection is not the human lot. If in some spheres we must accept coercion, let us not by reason of that fact embrace coercion as a positive good. It must be added, I think, that even if it were to be shown that the benefit of coercion today exceeded the evil it promoted, there is no evidence that human wisdom will promote the same result tomorrow. The greatest achievements of a free society have come unexpectedly and as a result of freedom of action. To claim to know how best to achieve a sound tomorrow by limitations on freedom of choice and action is to fly in the face of history.

If this assessment of the new liberalism appears unduly pessimistic or too unmindful of the needs of the public sector, it should be remembered that in a growing and prosperous economy these needs can be met within our present framework. More schools and roads can be built out of the growing revenues of society without need to shift the proportions of output directed by political action. What we must be concerned with, however, is that our growth continue within a framework of freedom and individual responsibility; that we not chase a will-o-the-wisp in the vain hope that we may capture Utopia; that we remember that no goods are costless and that freedom to choose is a value that cannot be held too dearly.



OUR "LINE" OF NEW CUSTOMER PRODUCTS AND SERVICES

ever changing, ever improving

On these and the following pages is an informal catalog of the varied, colorful – and highly efficient – new products and services which the Bell System is now offering to its customers. Here we see the results of the combined efforts of the Bell Laboratories, Western Electric, the Operating Companies and A. T. & T. to develop, produce and sell a line of products which not only effectively meet competition in the communications market place but also contribute importantly to convenient and efficient modern living. The products and services you see here are something more, too. They measure a new dimension of a vital and progressive business.

LOOK WHAT YOUR TELEPHONE CAN DO NOW!

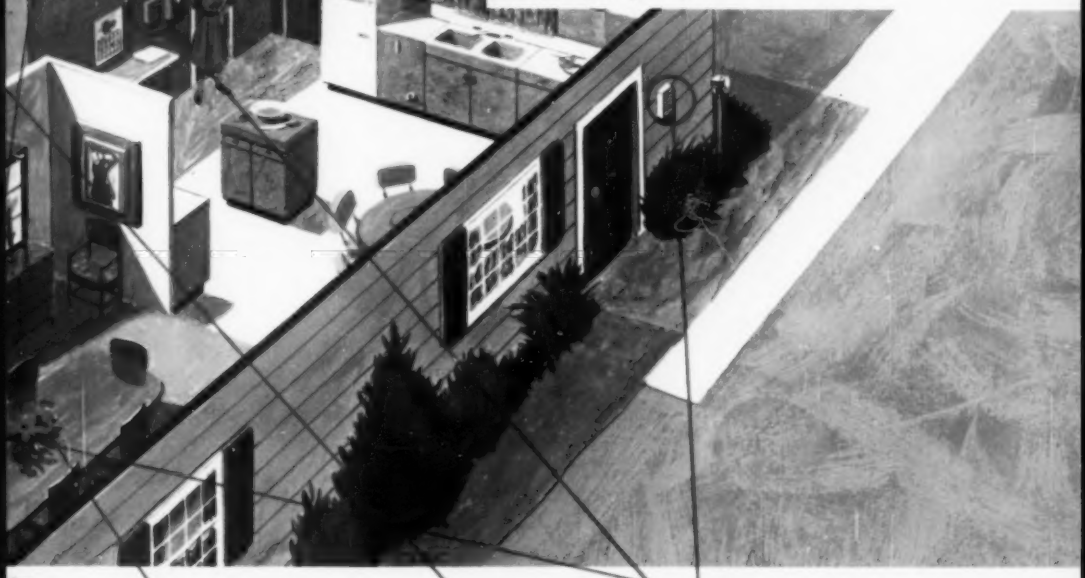
You can answer the door, talk from room to room, check on sleeping children – all by simply picking up the nearest telephone. The key to this new security and convenience is Home Interphone. The pictures show how its units work together.

Lovely little Princess sets with matching speakers fit most anywhere, light up for easy dialing.

Wall phones save kitchen space. They're fine other places, too.

FOR THE FARM

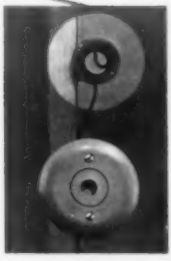
Farm Interphone is a new system which combines the household telephone with a wide range of intercommunication aids. With it, the farmer can handle outside calls, reach people around the farm indoors and out, call them to the phone by loud-speaker. Called person can answer without going to phone.



Desk phones come in several handsome decorator colors and add to the beauty of any room.

Bell Chime calls you to the phone musically. It can be set to ring loudly when you are outdoors.

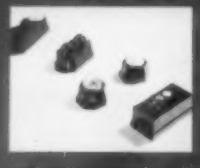
Door speaker: Talk with anyone at door easily, securely.



Cover plate for concealed wiring installed when home is built.

Loudest Bell

Horn



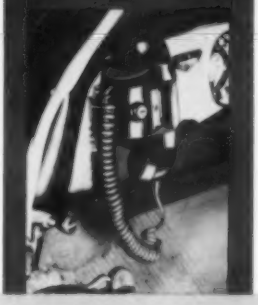
Lamp Indicator

Miscellaneous visual and audible signals.

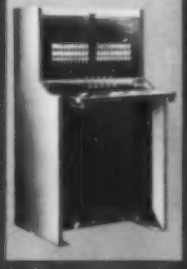
Message Waiting Service —flashing red light on phone tells motel or hotel guest messages are awaiting him.

Telephone Answering and Recording Set records a caller's message for play back to the customer.

New Artificial Larynx for people whose vocal chords have been surgically removed or whose vocal chords are inoperative due to paralysis.



Mobile Telephone Service allows intercommunication between a car, boat, truck, plane or train and any other telephone in the network.



Answering Service Switchboard—used to intercept calls at business or professional people who are out of their offices.

Walk-up and Drive-up Public Telephones provide service along highways, in parks, shopping centers.

Airlight Booth is for outdoor use in single installations. A wide variety of colors is available.

These booths are designed by the Bell Telephone Laboratories, produced for the Western Electric Company, and used by the Bell System Operating Companies.

These are new, special products designed to meet a broad spectrum of individual, business and public communications needs. They range in function from the specialized artificial larynx to the Drive-up, Walk-up phones.

FOR THE OFFICE...

As swift, accurate communications become more and more essential, these attractive, modern services bring new efficiency and dollar savings to the businessman.

High Speed Data-Phone provides the connecting link which allows two data processing machines to talk to each other over the telephone network.

Attendant answering position equipment used with small order taking system in stores, mail order concerns, etc.

Automatic send and receive teletypewriter transmits written messages from prepunched paper tape.

The Princess Telephone adds a tasteful touch to the reception room.

Pushbutton telephone can be used for internal or external communication and with speakerphone.

Low speed Data-Phone transmits information from punched cards over telephone network.

Universal Switchboard Has wide range of improved operating features, may be used with many types of PBX equipment.

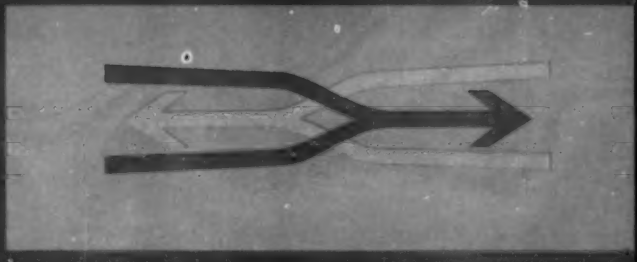
Speakerphones permit "hands free" conversation; are available mounted in a Call Director as shown here or as a separate unit (see push button phone picture above).

Telpak

A new service offering broadband communications channels which provide for the economical grouping of teletypewriter, signalling, voice, data and other private line services. It has the broader channels needed for high-speed data, computer-to-computer and other special broadband needs.

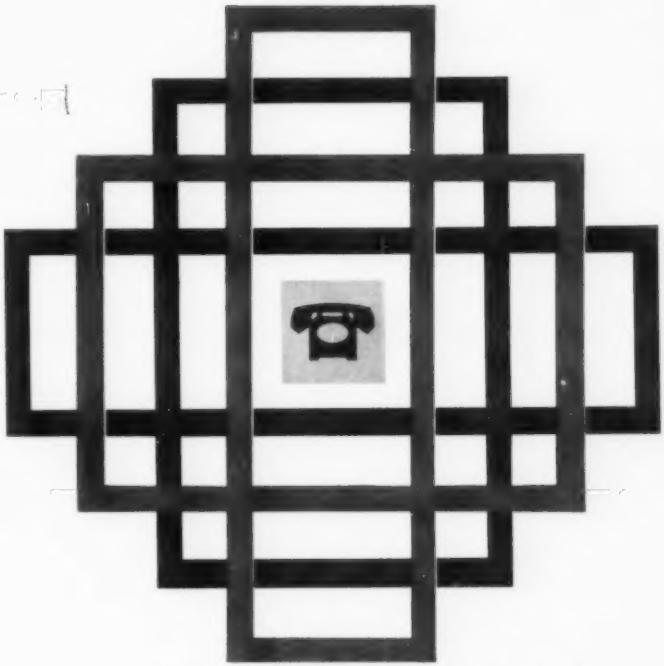
National Yellow Pages Service — New service for regional and national Yellow Pages advertisers on a "one contract — one contact — one monthly bill" basis for America's 4,000 different Yellow Pages directories.

Duo-Phone — An exciting new and flexible service concept which enables business machines to talk with each other at various speeds over regular telephone lines.



Group Alerting and Dispatching Systems. Provide quick, accurate voice notification of emergency to as many as 480 members of volunteer fire companies, Civil Defense units, etc., through their own home or business telephones.

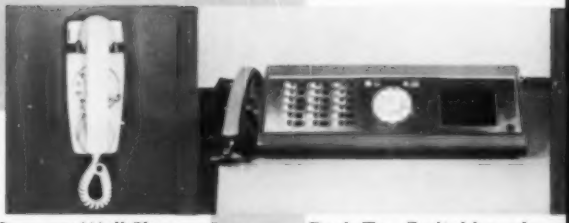
Emergency Reporting Systems. Reliable fast voice reporting of fires and other public emergencies direct to a central PBX is provided by means of these strategically located street telephones.



WATS — A new telephone service providing unlimited interstate calling within specified areas on a full or measured time basis.

NEW SERVICES

Here we see a major contribution to the future health and growth of our business — the variety of major new services designed to bring greater convenience and efficiency to our customers, and to meet the competition with which we are confronted on all sides; and, in the case of the Emergency Reporting and Group Alerting Systems, to make an added contribution to public safety.



Compact Wall Phone

Desk Top Switchboards–

Coin Collector

Desk Set

Wall Set

Touch Tone Sets: The touch of tomorrow; unique, deluxe service, easy to operate –just push the buttons.

Dataspeed – High-speed teletypewriter paper tape transmission system uses Data-Phone to send information over telephone network at 1000 words per minute.

Bellboy is a pocket receiver which sounds tone when a telephone message awaits user.

Modern, compact.

Integrated Card-Operated Dial telephone set designed to assist customers in dialing frequently called telephone numbers.

Dial-Recorder

Call Director

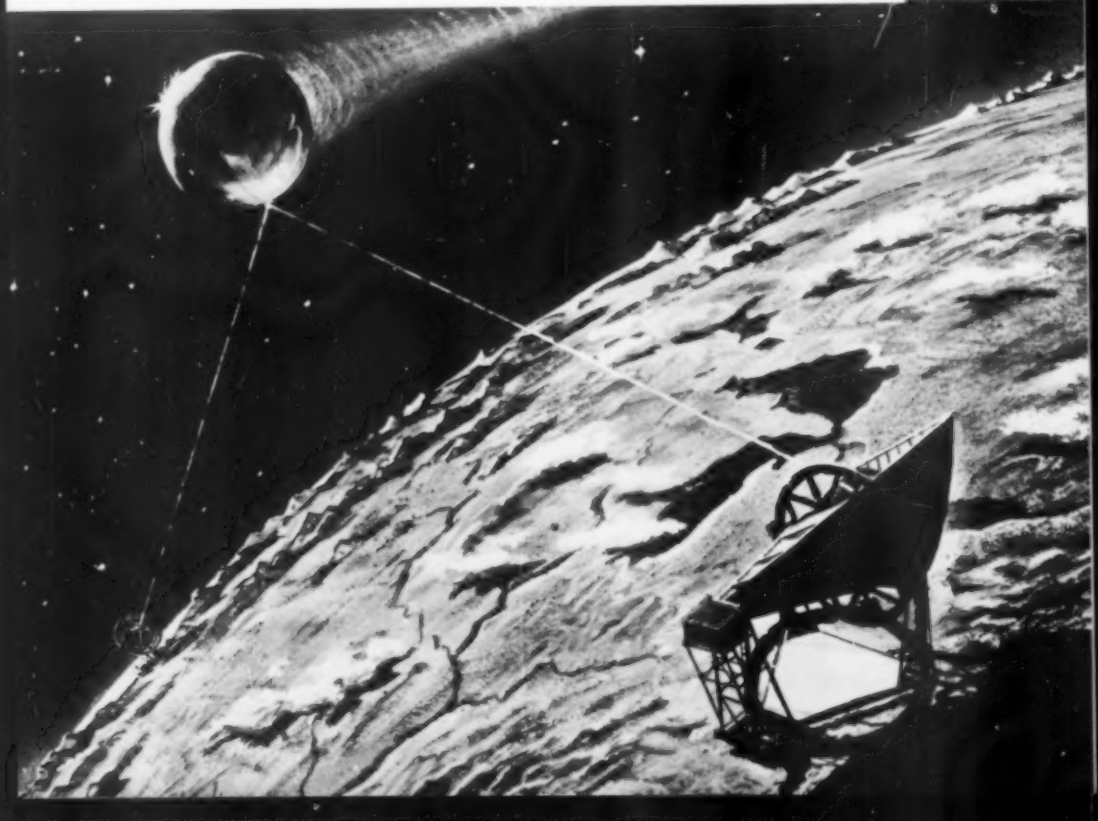
Princess

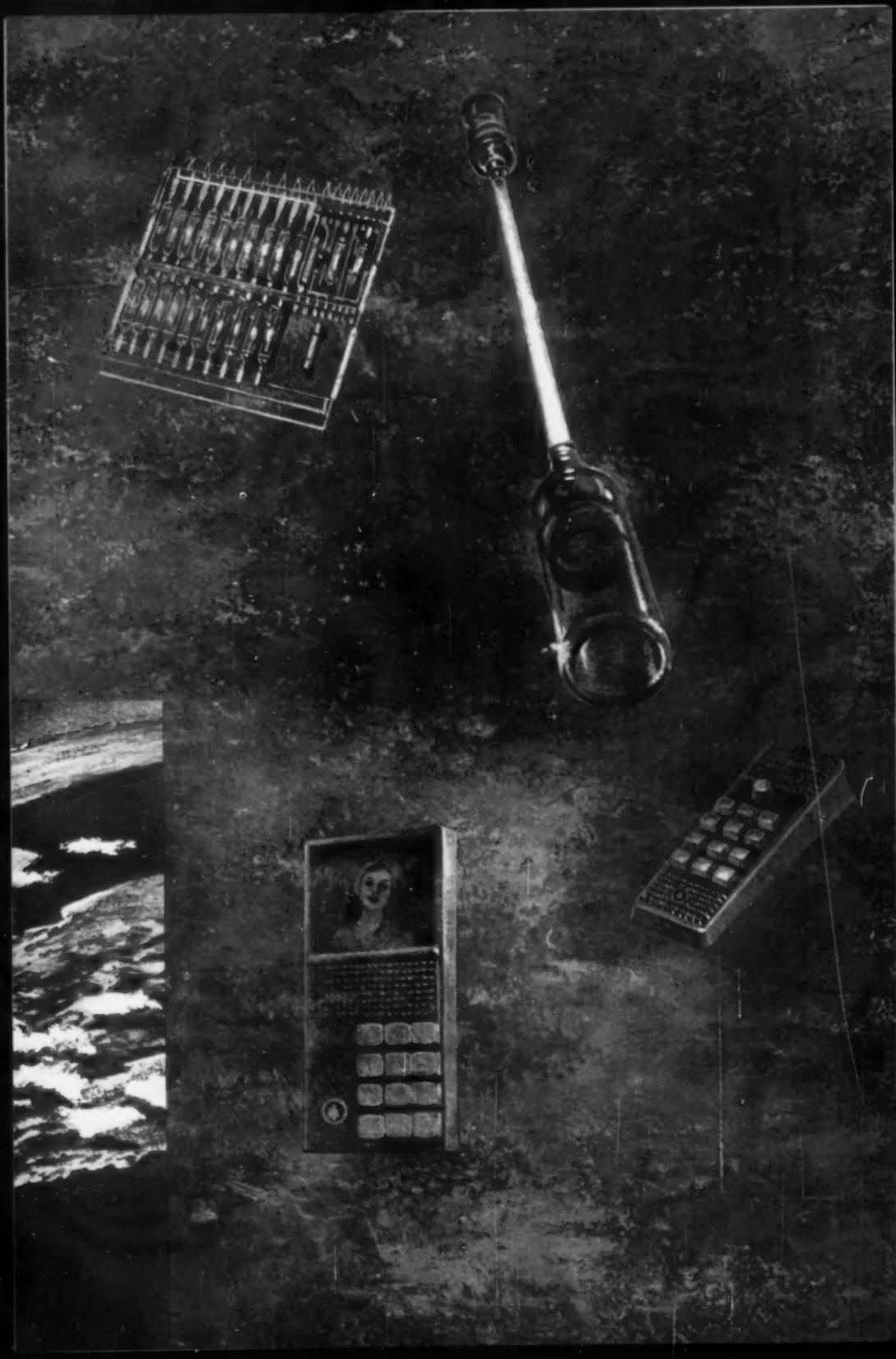
...model of new indoor telephone booth featuring curved sliding glass door. Metal with new molded fiberglass seat and shelf.

Our line is changing, growing, keeping pace with the advanced communications techniques which are now so swiftly emerging. Here you see possible products for tomorrow which are already undergoing market test.

THE FUTURE

New concepts, new techniques now taking tangible form in the Bell Laboratories foretell the communications wonders to come. But in this time of accelerated change, of sweeping scientific breakthroughs, no one can truly predict the full potential of tomorrow's products and services. The dim shape on today's horizon comes so quickly to grasp that tomorrow's commonplace can exceed today's boldest dreams. Only of this can we be sure: never have there been such challenges, such opportunities to serve, as tomorrow will bring to the Bell System and all its people. For those we must prepare today. Tomorrow will be here before we know it.

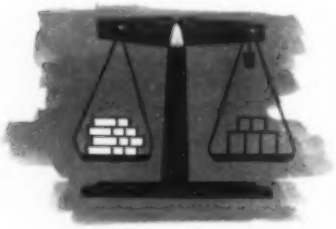




The crisis is not yet upon us, but it will come if this problem in our international transactions is not solved

The Gold Problem

John C. Swartley, *Chief Statistician and*
Irving A. Lowell, *Supervising Statistician*
COMPTROLLER'S DEPARTMENT, A. T. & T. CO.



WHEN THE PRICE of gold in London soared suddenly, if briefly, to $40.60 an ounce last fall, after several years of stability around $35.00, the American public was shocked into awareness of a problem which has been growing in seriousness over the past three years. The widespread publicity and public debate concerning the gold problem and the means of solving it has been a most healthy development. It has brought wider recognition of the critical brake that our international balance of payments exerts on United States' spending policies both at home and abroad. This is a matter which concerns every citizen.

The explanation of last fall's gold price flurry has its basis in a problem in U. S. international transactions. Specifically, the apprehension that devaluation of the dollar might occur within the foreseeable future touched off suddenly increased demand for gold in a thin market. Such apprehensions developed because of a marked shift in our balance of payments position in the last few years.

Ten years ago, the balance of payments problem centered around a "dollar shortage" in the free world. Our position as the only major industrial nation unravaged by war made it inevitable that other nations would turn to us for the goods they so desperately needed. We supplied these goods, making purchases from us possible by outright gifts, by direct loans, by pri-

vate and public investment and by Marshall Plan aid. Had we not so developed the purchasing power of friendly nations, their productive capacity would be measurably less today. It was our determined and specific objective to help rebuild the economic strength of the nations of the free world to the point where they could be self-sustaining and could regain their positions as world powers.

Our policies have been successful. Germany, France, Italy, Britain and Japan, to name only a few, are enjoying a level of economic prosperity undreamed of ten years ago. Our efforts to reduce the dollar shortage were reflected in the U. S. balance of international payments. During most of the last decade this balance of payments has been a negative one or two billion dollars yearly. In 1957, the balance was slightly positive due to the Suez crisis, the poor crops in Europe and the high level of business in the U. S. Balances of this sort were manageable and even desirable.

However, in 1958 we had a $3½ billion negative balance (after adjustment for errors and omissions). In 1959, it was about $4 billion* and in 1960 the deficit apparently reached nearly $4 billion again. These levels are not manageable or desirable.

These deficits in our international balance of payments result from a number of interactions. The outflow of funds is due principally to:

- Capital invested abroad.
- Foreign aid.
- Military expenditures.

The inflow of funds to the U. S. results mainly from:

- Net merchandise exports.
- Return on invested capital.

*Excluding payment of a nonrecurring $1,375 million U. S. subscription to the IMF.

Direct business investment in productive facilities abroad has increased substantially since 1955. In part, such investment is stimulated by differential production costs. Production facilities abroad are often needed to compete in foreign markets. In other cases, host nations prefer complete production facilities within their own borders instead of only the extractive industries such as mining.

Governmental insistence on such arrangements increases the required capital expenditures. Moreover, it sometimes is more profitable to build a plant in an industrial foreign country, manufacture goods and import them to the U. S. than to produce the same item here. The outflow of funds has been accentuated by the relative cheapness and availability of money in the U. S. The differentials have been such that even productive facilities abroad built by foreign nationals have been occasionally financed by security flotations in this country.

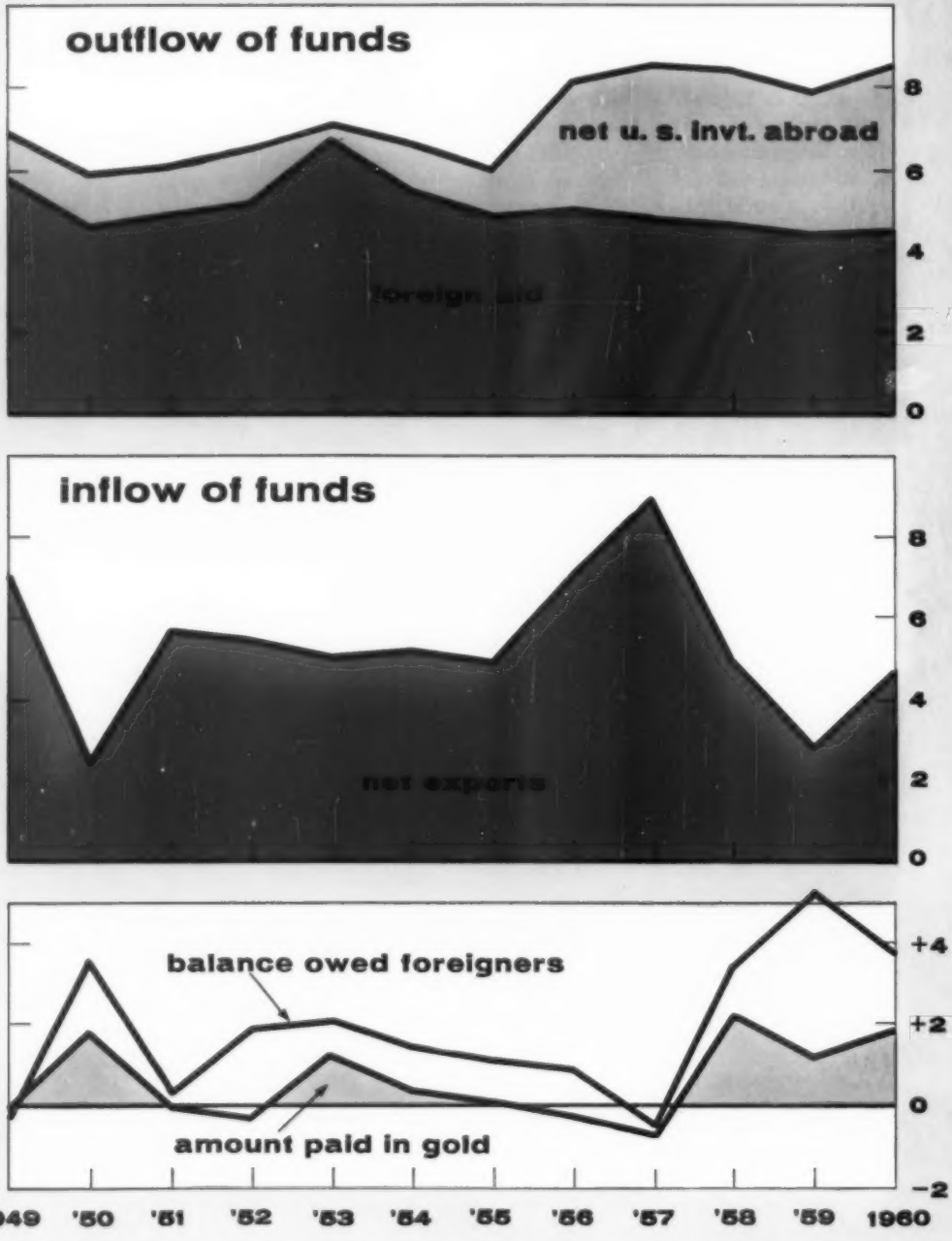
Foreign Aid

The principal elements of the United States foreign aid program are government loans and dollar grants to other nations, and the shipment of U. S.-produced military supplies abroad. For simplification, such transfers of funds as the payment of pensions to U. S. nationals living abroad and private gifts to individuals in other nations can be considered in this category also.

Our overseas military expenditures have been extensive—about $2.8 billion in 1959. The smaller item of net travel and transportation expenditures added another $800 million to the outflow of U. S. funds that year.

The inflow represented by our net merchandise exports has been substantial in some years, but in 1959 dropped

U. S. BALANCE OF PAYMENTS
(billions of dollars)



to under a billion dollars. A primary support of our positive net export balance, and the reason any inflow of funds occurred in 1959, was the income from capital invested abroad. Dividends and interest on U. S. foreign investment should increase in time as the profits from the capital outflow of recent years are realized.

An Immediate Problem

However, the settlement of our present deficits in either dollars or in gold is an immediate problem. During the years 1949 through 1957, foreign dollar holdings increased from $7½ billion to $15 billion at a relatively constant rate. These gains strengthened the other currencies of the free world and permitted great progress toward freer conditions of trade.

During this period the U. S. dollar was the strongest currency of the world. Despite our readiness to convert dollars to gold at the request of any foreign monetary authority, U. S. gold reserves declined slowly but erratically from $24½ billion to just under $23 billion. Conversions from dollars to gold were minor because foreign dollar holders felt that dollars were "as good as gold."

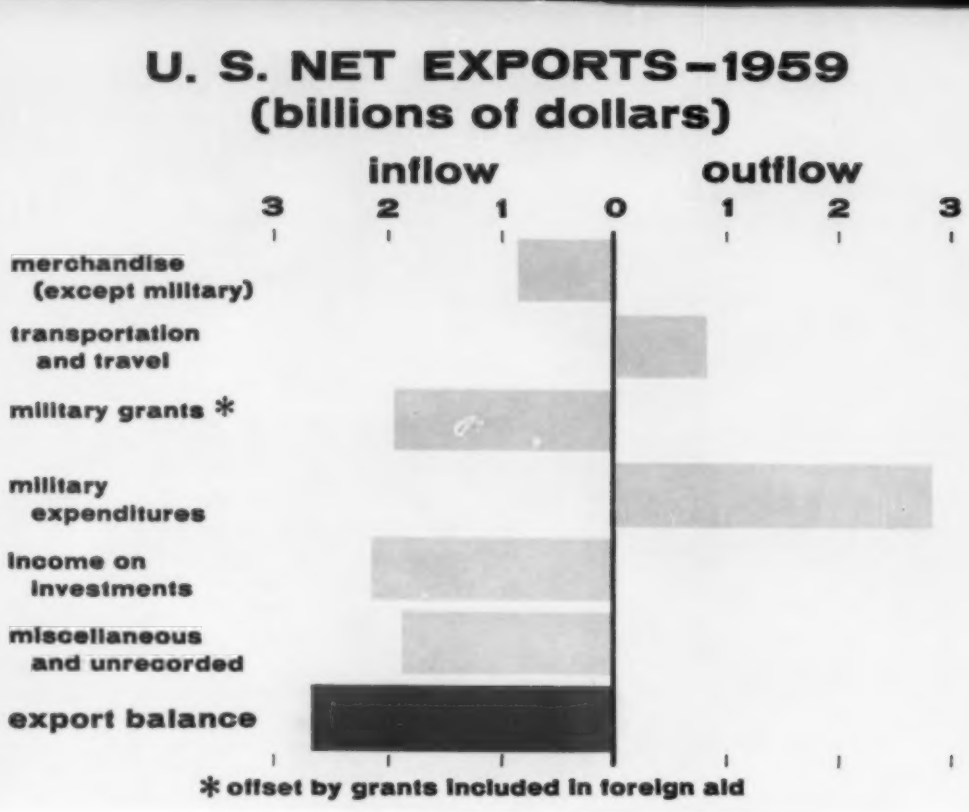
In 1958, our gold reserves declined over $2 billion. In 1959, the decline was $1 billion. In 1960, we lost almost $2 billion additional and U. S. gold stocks declined to $17.8 billion—the lowest level since 1940. About $1.5 billion of our 1960 loss took place after June 30th. Obviously, a change in climate had developed that made gold seem more desirable than increased dollar holdings. It is this sudden drain on our gold reserves that has directed so much attention to the U. S. balance of payments problem and the necessity of adjusting our activities to correct what is potentially a seriously unfavorable development.

Needed—Prompt Corrective Action

No emergency is yet upon us. Our gold reserves are still ample if corrective action is reasonably prompt. Our gold stock is by far the largest in the world and about equal to the total holdings of the Western European nations and the British Commonwealth combined. Yet, our position is peculiarly important. Because we maintain the dollar's free convertibility into gold on request of any foreign monetary authority, the dollar is a "reserve currency" and its stability is of utmost importance to trade within the free world. The large dollar holdings of foreigners—now about $21 billion—make every change of monetary policy within the U. S. a topic of intense interest in banking circles abroad.

Foreign banks' decisions to increase gold stocks or to increase dollar holdings are made with a number of considerations in mind. Trading requirements necessitate a certain volume of dollar holdings to facilitate transactions. These are usually kept in the form of deposits with U. S. banks. Funds not kept as deposits are primarily invested in U. S. short-term securities where they can earn interest. When these funds are converted to gold, there is not only a loss of interest but storage costs are incurred.

When apprehension arises over the future purchasing power of the dollar, conversion to gold becomes more attractive. Much of our gold loss since 1957 seems to be traceable to such concern. Large U. S. budget deficits in poor years and small surpluses in good years are signals that suggest to foreign bankers a loss of dollar purchasing power. When coupled with what



seems an unwillingness to adopt more conservative measures, and when considered in the light of our already large gold losses, a certain amount of nervousness is understandable.

In mid-1960, a new factor intensified the conversion to gold. As the U.S. economy sagged during the year, the Federal Reserve took steps to ease credit, money became more available and interest rates in the U. S. fell.

On the other hand, foreign economies were still booming and interest rates remained high. By contrast with our 3 per cent rediscount rate, the rate in Britain is 5 per cent and in Germany was 5 per cent from June to November of 1960. Investments at higher yield have been available abroad. To take advantage of these higher rates, both U. S. and foreign investors have exchanged short-term investments in U. S. securities for foreign investments. As foreign governments acquired dollars, their ratio of dollars to gold increased, and an exchange of some dollars for gold has been made to bring their holdings more in line with what they consider to be desirable banking practices.

Normally, the flow of funds overseas would be self-correcting. As funds flowed from the U. S. to other nations, interest rates abroad would fall, interest rates here would rise, and the flow would subside or reverse. However, the economies of these nations are still operating at a rate sufficiently

high to make control of inflation a major concern. Therefore, high interest rates and tight money are necessary. The self-correcting aspect of international money flow is only operable if the business cycles of the various countries are roughly in harmony. Since this has not been the case, we have been experiencing a continuation of gold flow at a rate higher than sustainable over a long period.

What Can We Do?

Obviously, if we did not have a negative balance of payments, we would not now have a gold problem. What then can we do to reduce our balance of payments to what would be an acceptable level?

We could put restrictions on the flow of capital abroad. As a short-term solution, this has some merit when the nations involved are heavily industrialized and already large holders of dollar assets. One of the restrictions might be to require that all U. S. investment in plant facilities abroad be substantially matched by investment in both debt and equity securities by nationals in the host country. This would have the double effect of increasing the host nation's interest in the profitable operation of the plants, and of reducing the flow of capital from the U. S. However, for the long term, this would also reduce the inflow of funds from abroad, and in the case of underdeveloped nations, a reduction in U. S. capital expenditures would also reduce the potential market for our goods.

We could reduce our military expenditures abroad, and action has been taken along these lines already. Our Defense Department is taking steps to purchase supplies in the U. S. and ship them abroad wherever possible. While the increased shipment of goods has no effect on our balance of payments, the reduction of expenditures abroad has a direct impact.

We have instituted a stricter "buy-American" program for economic aid

GOLD IN FLIGHT

These pictures from The New York Times *show what happens when gold flows from the U. S. to a foreign country. Actually it travels only six blocks in downtown New York—from the U. S. Assay Office to the Federal Reserve Bank where the ingots are earmarked for foreign governments and central banks. Last year a 15,000-ton stack of ingots made this trip. Contrary to popular assumption, none of it came from Ft. Knox.* (continued on next page)

Ingots are cast at Assay Office.

and have curtailed sales of agricultural surpluses where they compete with commercial sales.

Our foreign aid program can be reduced by asking other friendly, prosperous nations to take over some of this burden. Some success in this area has already been achieved. A further reduction of pressure on our gold would occur if we increased our grants in kind and reduced our grants in dollars. However, a sudden cut in our foreign aid not supplanted by aid from some other Western power would only make easier the domination of uncommitted nations by Communism.

As recommended by the President, the duty-free allowance on imports U. S. citizens traveling abroad bring with them on their return can be reduced. This should both increase total U. S. tax revenues, and indirectly curb the dollars spent by U. S. citizens in foreign nations.

Within the limits of security requirements, we can take steps to encourage foreign visitors to travel in the United States. Any additional flow of funds so generated would be a step in the right direction.

A real solution lies in increasing the export of our goods. A great deal of effort has been expended along these lines already. Other friendly nations have been urged with some success to reduce discriminatory restrictions against U. S. goods. Once necessary to protect their dollar balances, these restrictions are now artificial barriers to our exports. We are searching for and finding additional markets for our goods. Business is being aided in developing and tailoring products to foreign markets. Some consideration is presently being given to methods of encouraging replacement of outmoded U. S. machinery with newer, more efficient machines to decrease our unit costs of production.

The Ultimate Solution

Ultimately, however, the solution to

Gold in Flight (continued from previous page)

Serial numbers are stamped on ingots.

Guard opens vault

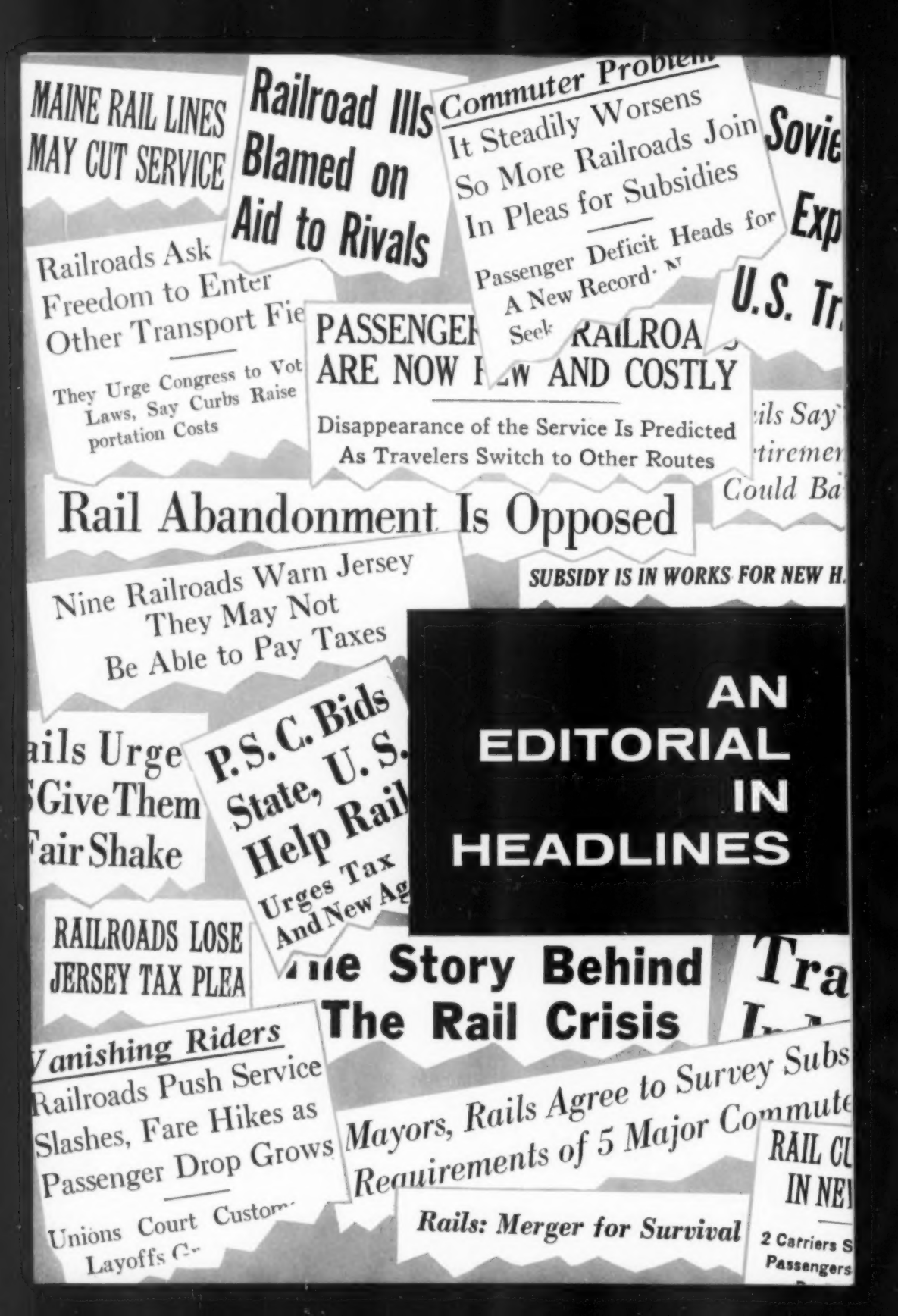
our balance of payments deficit must rest not on the government but on business and labor specifically and on the individual U. S. citizen in general. We must maintain our present control of inflation by a Federal budget that on the average is balanced, and by keeping wage costs in line with the efficiency of production. We must recognize that competition extends beyond our borders and that to compete in international trade the same combination of ingenuity and toughness is required as is necessary in the domestic market.

When confronted by such problems in the past, the United States has never failed to rise to its responsibilities. There is no reason to believe we will do less than that now.

Ingots are checked, weighed, upon arrival at Federal Reserve Bank.

Then they are stacked in a cage and counted.

Gold is stacked in vault aisle prior to being placed in compartments.


MAINE RAIL LINES MAY CUT SERVICE
Railroad Ills Blamed on Aid to Rivals
Commuter Problem
It Steadily Worsens
So More Railroads Join
In Pleas for Subsidies
Passenger Deficit Heads for A New Record
Railroads Ask Freedom to Enter Other Transport Fie
They Urge Congress to Vot Laws, Say Curbs Raise portation Costs
PASSENGER ARE NOW AND COSTLY
Disappearance of the Service Is Predicted As Travelers Switch to Other Routes
Rail Abandonment Is Opposed
Nine Railroads Warn Jersey They May Not Be Able to Pay Taxes
SUBSIDY IS IN WORKS FOR NEW H
AN EDITORIAL IN HEADLINES
P.S.C. Bids State, U.S. Help Rail
Urges Tax And New Ag
ails Urge Give Them Fair Shake
RAILROADS LOSE JERSEY TAX PLEA
The Story Behind The Rail Crisis
Vanishing Riders
Railroads Push Service Slashes, Fare Hikes as Passenger Drop Grows
Unions Court Custom Layoffs
Mayors, Rails Agree to Survey Subs
Requirements of 5 Major Commute
Rails: Merger for Survival
RAIL CU IN NE
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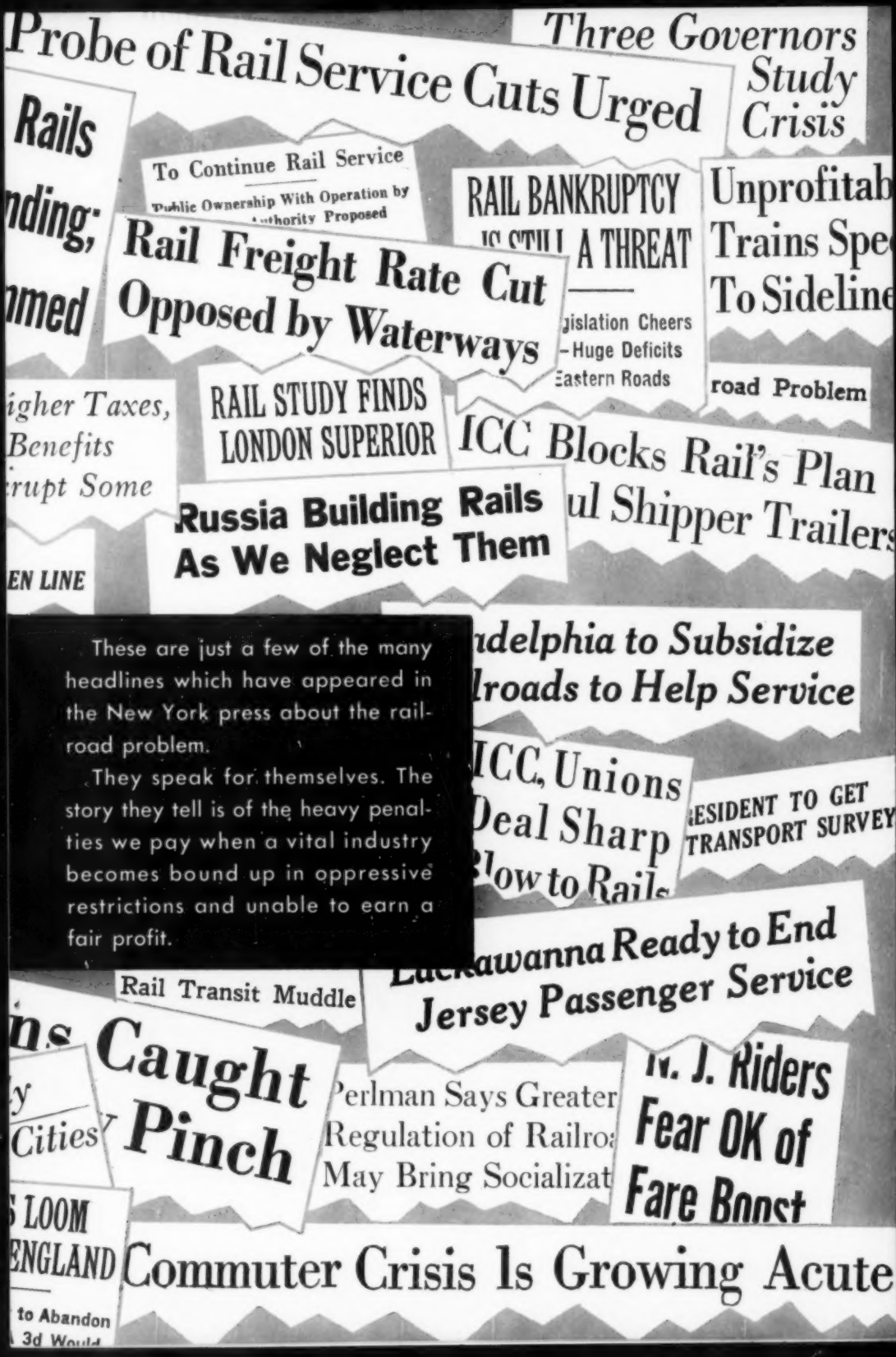
Probe of Rail Service Cuts Urged
Three Governors Study Crisis
Rails
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IS STILL A THREAT
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To Sideline
Rail Freight Rate Cut
Opposed by Waterways
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RAIL STUDY FINDS
LONDON SUPERIOR
ICC Blocks Rail's Plan
ul Shipper Trailers
Russia Building Rails
As We Neglect Them
EN LINE
These are just a few of the many headlines which have appeared in the New York press about the railroad problem.
They speak for themselves. The story they tell is of the heavy penalties we pay when a vital industry becomes bound up in oppressive restrictions and unable to earn a fair profit.
delphia to Subsidize
roads to Help Service
ICC, Unions
Deal Sharp
Blow to Rails
ESIDENT TO GET
TRANSPORT SURVEY
Rail Transit Muddle
Lackawanna Ready to End
Jersey Passenger Service
ns Caught
Pinch
Cities
Perlman Says Greater
Regulation of Railroa
May Bring Socializat
N. J. Riders
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Fare Boost
S LOOM
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to Abandon
3d Would
Commuter Crisis Is Growing Acute

Who's Who & What's What In This Issue

Rodney M. Goetchius

AS MANAGER, Project Mercury, in Western Electric's Defense Projects organization, Rodney M. Goetchius is admirably equipped to discuss "The Bell System's Role in Project Mercury" page 2. His article has special timeliness as the eyes and ears of the world focus on news of developments in America's man-in-space project.

After many years in increasingly responsible engineering positions in the A. T. & T. Long Lines Department, Mr. Goetchius joined Western Electric in February, 1958, as assistant project manager in charge of engineering on the ADES project; he was appointed manager, project services, on July 1, 1959. With the selection of Western Electric as prime contractor for the world-wide network of tracking and ground instrumentation stations to be used in Project Mercury, Mr. Goetchius was named to his present position on August 1, 1959.

Mr. Goetchius is a member of the American Institute of Electrical Engineers and a former chairman of the Communications Division in Philadelphia, Pa. He is also a member of the Armed Forces Communications Association, and the M. I. T. Alumni Association.

HARVEY J. MCMAINS, administrator, data communications planning, is squarely in the middle of one of the most exciting, not to say revolution-

Harvey J. McMains

ary, developments to come to the Bell System in a long time. His major concerns are the tremendous marketing potential of data transmission over

Bell System facilities; what data services should be offered to meet customer needs; when and how the market should be stimulated, and market contacts with business machine manufacturers. In "It's Data-Phone in 1961!" which begins on page 13 he stresses that the Data-Phone concept which is just being introduced promises to help the System reach new heights of service to our customers. "But the future will only be as good as the planning we do today."

Mr. McMains came to A. T. & T. from the Southwestern Company in 1959 to organize the new Data Communications Planning Section of the Marketing Department. He spent the summer attending the Graduate School of Business Administration of Columbia University studying operations research, marketing, national income cost accounts and other management topics.

His prior Bell System experience had been in the Engineering Department where he held various positions including chief engineer. He holds a Master's Degree in physics and has taught mathematics and engineering subjects in several southwestern universities. One subject he taught and has always enjoyed is statistics, "which should come in very handy when analyzing the present and future requirements for data services from our customers," he says.

IN "THE NEW LIBERALISM VS. THE FREEDOM TO CHOOSE" page 21, Dr. Warren W. Shearer takes direct issue with some of the most plausible-sounding arguments of what he terms the "new liberalism." Analyzing these arguments from the conservative view, he points to some of the serious pitfalls that would be encountered if the new liberal proposals for the correction of "social imbalance" were ever to be put into effect. All in all, Dr. Shearer's exposition is an unusually lucid and straightforward treatment of a complex subject. He encourages us to do some serious thinking on our own concerning matters that are widely debated and of considerable consequence.

Warren W. Shearer

Dr. Shearer received his A.B. degree in 1936 from Wabash College. He began his career as a teacher of speech, having in mind a later one in law; but opportunity beckoned him to his major field, economics, which he has taught at Wabash for many years. He has been at Wabash—apart from leaves-of-absence for government service, including a six-month's tour of duty with the United States Naval Reserve in Japan—since 1936. He has an A.M. degree, 1940, from the University of Wisconsin and a Ph.D., 1952, from Harvard University. From 1954 until September of 1956 he was deputy director and then acting director of the Office of Economic Affairs, United States Mission to NATO in Paris.

His present position is chairman of the Department of Economics and of the Division of Social Sciences, Wabash College, Crawfordsville, Indiana. He is a member of the American Economics Association and Council on Foreign Relations, and a past president of the Indiana Academy of the Social Sciences.

HIS EXTENSIVE background of study and analysis in broad areas of economics as A. T. & T.'s chief statistician, has well equipped John C. Swartley to write for us on "The Gold Problem," page 40. This is a topic of which the American public has become increas-

John C. Swartley

ingly aware in recent months; and, as Mr. Swartley points out, it is indeed a matter that concerns every citizen.

Mr. Swartley entered the Bell System in June, 1924, with the Long Lines Commercial Department, serving several years there followed by a period of time in the Operation and Engineering Department. He returned to Long Lines in 1940 and was general commercial engineer before going on military leave. After his wartime service Mr. Swartley in 1945 joined the Comptroller's Department as statistician, economic studies. He advanced to the post of general statistician, economic and telephone studies, in 1950 and since 1958 has been chief statistician.

This is the second contribution Mr. Swartley has made to this magazine. In the Summer 1959 issue he contributed "Government Finances in Economic Perspective."

Irving A. Lowell

THE IMPACT of international transactions on the U. S. economy makes U. S. gold losses a natural concern of any one trying to evaluate the future. Since Irving A. Lowell's principal duties are the formulation of Economic and Telephone Views, co-authoring "The Gold Problem" with J. C. Swartley is both a logical extension of such duties and an excellent example of the wide range of developments that affect the telephone business.

Prior to his present assignment, Mr. Lowell spent several years in Market Research work, both in the Chief Statistician's Division of A. T. & T. and in The Mountain States Telephone Company in Denver. He transferred to A. T. & T. in 1956 and has been supervising statistician for about three years.

In The News

- *New Overseas Projects*
- *WATS and Telpak*
- *First Bills from a Computer*
- *Labs Receive Science Award*
- *Nike Zeus System Successful*
- *Growing Quartz Crystals*
- *New Market Trials*
- *Protecting Essential Records*

To strengthen and improve the existing communication system in the Caribbean area, Long Lines issued plans in late October for a deep-sea telephone cable to extend 390 miles between Puerto Rico and Antigua. The schedule calls for the system, a single coaxial cable equipped for two-way transmission and having a capacity of 84 voice circuits, to be completed by the end of 1961.

The new cable is to be jointly owned and constructed by the A. T. and T. Company and Cable and Wireless (West Indies) Ltd., a British company. Each will have a half interest in the system, and Long Lines will construct this end of the cable.

The intention to build a large-capacity underseas telephone cable between the U.S. and Jamaica in the British West Indies was announced by A. T. & T. in late December. Ultimately the cable will be used for connections to other locations in the Caribbean and in South America. The proposed system, to land near Florida City, Fla., is owned jointly by the A. T. and T. Company and Cable and Wireless (West Indies) Ltd. It is scheduled for completion by the end of 1962.

The system will have three times the capacity of the first transoceanic telephone cable laid four years ago, and will introduce the first of a new type of telephone cable designed to handle up to 128 voice circuits. In the deep-sea section, Long Lines, which is responsible for the construction, will use a newly developed "armorless" cable, with a plastic outer coating instead of armor wires and a stranded steel core for tensile strength. Rigid-type amplifiers, developed by the Bell Laboratories, will be spaced about 20 miles apart in the cable.

Wide Area Telephone Service which went into effect on January 15, is a new interstate service designed to meet the needs of customers having large volumes of telephone communications over a wide area. In effect it will permit them to call over the country at a flat monthly charge per line.

Six specified calling areas will be available from each state or state subdivision in the continental U.S., of which there are 58 including the District of Columbia. Two classes of service are offered—Full Time service and Measured Time service. Full Time service will permit unlimited calling within the selected service area at a flat monthly charge for each line. Measured Time service will permit calling within the selected service area for a period of 15 hours of accumulated time per line per month at a flat monthly charge, and additional use at hourly rates.

A major step forward in the Bell System's Electronic Data Processing Program was made in December at the Pennsylvania Company's Conshohocken, Pa., Revenue Accounting office. For the first time in the Bell System, telephone bills were produced by a large electronic computer. These bills were mailed to about 8,000 customers in suburban Philadelphia. This project represents five years of effort by Bell System people.

The American Association for the Advancement of Science (AAAS) has presented its annual "Industrial Science Achievement Award" to Bell Laboratories.

This award is given each year to the company that helped significantly to demonstrate one or more of the objectives of the Industrial Science Section of the AAAS. Included in these objectives is the "advancement of knowledge and the practical application of science in industry." The citation to Bell Laboratories was for its achievements in the field of universal communications during 1960.

Among the advantages cited were: the successful experiments in long-distance communication by reflecting radio signals from the passive satellite Echo I. These experiments were conducted in cooperation with the National Aeronautics and Space Administration.

The guidance system for the Nike-Zeus anti-missile missile, designed and developed at Bell Laboratories, proved successful in a recent test-firing at White Sands Missile Range, New Mexico.

Controlled commands were sent to the missile as it sped through the sky, and it responded to them to perform a planned turn in trajectory. A complete tactical guidance system was carried in the missile itself.

The missile was fired by personnel from the Army, Bell Laboratories, and the Douglas Aircraft Company. One of the test objectives was to determine whether the missile's advanced aerodynamic design could withstand the tremendous pressures and structural forces resulting from its extremely high speed. The wingless Nike-Zeus is designed to meet the exacting requirements for a missile to maneuver and move fast enough to intercept intercontinental ballistic warheads traveling at speeds above 15,000 miles per hour.

Kwajalein Island will become the site of the 18th branch of Bell Laboratories early this year when it begins to operate as a testing ground for the Nike-Zeus anti-missile missile system. When completed, this installation will become the fifth test center for Nike Zeus, behind White Sands, Ascension Island, Point Mugu, California, and, of course, the BTL Whippany Laboratories.

The primary purpose of the Kwajalein Laboratories will be to "prove" the results of tests conducted at the other four test sites, concentrating on the radar capabilities of Nike-Zeus. Basically, the test plan is designed to find the margins of the Zeus defense zone, and also to demonstrate the effectiveness of the weapon system.

Effectiveness of the Zeus equipment will be tested against intercontinental ballistic missiles launched from Vandenberg Air Force Base in California, 4900 miles away, and guided down range toward the Kwajalein area.

The first service offering of Touch-tone calling began in November. The Ohio Company introduced this service first in Findlay; the Pennsylvania Company will start sales in February in Greensburg.

Touch-Tone calling is a faster and easier method of originating calls by operating buttons instead of using the conventional dial.

A ten-button rectangular unit replaces the rotary dial in the telephone. As each button is depressed, a combination of two tones in the voice frequency range is gen-

erated by the set to indicate to the central office equipment the proper digit or letters. The user hears the tones being transmitted over the line to the central office as the buttons are depressed.

For the central office and PBX's, Bell Laboratories have designed a special receiver-converter which translates the voice frequency tones generated by the Touch-Tone set into "language" the standard dial equipment understands.

The trial, which is expected to run at least one year, will help us determine how and to what extent Touch-Tone calling can be marketed.

A product trial of two small Dial-In-Handset telephones—one of angular design, the other with curved lines—started in October in Richmond, Va. They are attractively styled and feature the portable dial concept, built-in miniaturized ringers, and dial night lights. The design of these sets makes them suitable for wall or desk type installations and the trial will determine if one of these may have a place in our line as a new premium telephone.

Two hundred residence customers comprising an equal sample of desk and wall set users will test the trial telephones during a period of three months. The main objectives of the trial are to gain customer reaction to the appearance and use of the instruments and to determine customer preference.

A. T. & T.'s Treasury Department is feverishly completing its preparations for handling the 1-for-20 stock offering which the Company is making to its share owners of record February 23rd. This is the tenth offering of A. T. & T. securities to share owners through the medium of rights since the war. Eight of these offerings were of debentures convertible into A. T. & T. stock, but there was also one direct stock offer in 1956.

Work volumes are expected to be very much higher than for any previous rights offering in the Company's history. Rights are being issued to more than 1,900,000 share owners, compared with about 1,400,000 in the 1956 offering and 1,600,000 for the 1958 convertible offering. It is anticipated that subscriptions will total around 1,000,000, up about 1/3 from the 1956 stock offer. Incoming mail items are expected to total over 1,600,000, and stock purchases handled over the counter are expected to account for 100,000 public office contacts.

New model of Nike Zeus.

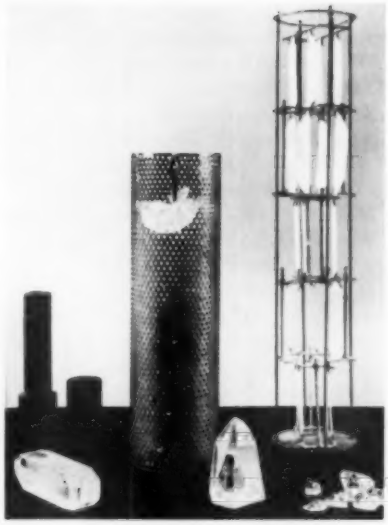
In spite of the fact that these work volumes represent about a third increase over the 1956 offering, it is estimated that only 600,000 hours of work will be required, about the same as in 1956. This was made possible by the mechanization of the stock records through the use of electronic data processing equipment, which took place in the interim between the two offerings.

A new quartz-crystal "growing" plant has recently been completed and placed in operation at Western Electric's Merrimack Valley Works in Massachusetts.

Representing one of man's triumphs over Mother Nature in the "how-to-do-it" department, the new plant is the first of its kind specifically designed to produce quartz crystals for industrial use on a large scale. Why and how this came about is the story of one of the most significant Bell System engineering developments since World War II.

Quartz has long been needed in volume by Western Electric as an essential component of crystal filters and oscillators for multi-channel telephone transmission systems. Normally imported from foreign sources, the supply of natural quartz crystals of sufficient size and quality for Bell System requirements has been relatively unstable and costly. In 1946, scientists at Bell Laboratories began looking for a way to produce quartz artificially.

Ten years later, Bell Labs had successfully developed and turned over to Western Electric the first scientifically-controlled hydrothermal process.



Artificial quartz crystals.

Nearly all Bell Companies have given some attention to the protection of their essential records in the event of an emergency. Some companies have made considerable progress and have active programs. Plans are well along and construction has started on the first Bell System Regional Essential Records Protection Center near Princeton, New Jersey.

Discussion of the Companies' programs for protection of records and the new Center at Princeton at a recent conference, prompted the question as to whether additional Regional Records Protection Centers might not be desirable in view of the economies of such a joint venture.

The Companies are now reappraising their current records protection programs and considering whether it would be to their advantage to join with bordering companies in establishing such centers. The following approach has been suggested:

Each company determine the volume of its essential records to be protected in emergencies.

Determine the type of facility desired to afford such protection and whether the facility should be provided for a company's exclusive use or whether participating in a regional center would be equally effective and more economical. If the latter, discussions should be started with adjacent companies.

Based on the decision as to each company's intentions regarding exclusive or joint participation, it would then be appropriate for their chief engineers to re-

view all buildings and additions in the planning stages which might be considered as locations for protection centers.

Locations would be selected on the basis of convenience, relation to target areas, etc. Locations should not be in any target areas or at any site or telephone center which may be a potential target because of its increasing importance.

The United States Post Office honored the world's first communications satellite, Echo I, by issuing a four cent "Communications for Peace" stamp. The stamp was placed on sale in Washington, D. C., in December.

The Echo I postage stamp commemorates the historic launching of the balloon satellite last August, and the space communications project conducted by the National Aeronautics and Space Administration in cooperation with Bell Laboratories and the Jet Propulsion Laboratory.

A compact, transistorized voice frequency repeater, called the "E-6," is now being produced at Western Electric's Merrimack Valley Works.

Voice frequency repeaters are widely used in central offices throughout the Bell System, amplifying voice signals and restoring the original volume lost over miles of telephone circuits.

Developed by Bell Laboratories, the new E-6 Repeater has several attractive operating features. It will do the same job as two older vaccum-tube repeaters in combination, while taking up only half the space previously required. And it will operate on much less power by employing transistors rather than vacuum tubes.

The E-6, which is expected to largely replace the older E-2 and E-3 models made at Merrimack Valley for several years, is a plug-in unit made of printed wiring boards and miniature components. It is contained in a single metal frame smaller than a lady's shoe box.

Annual production of some 150,000 to 200,000 of these repeaters is required to meet the telephone companies' needs. Faced with a demand of this size, Merrimack Valley has concentrated coil winding, assembly, inspection and testing operations in one department. At present, most of the assembly operations are done manually. Plans are underway, however, to mechanize some of the work; and a semi-automatic assembly line is envisioned.

Making the E-6 Repeater at W. E.

As mechanization of telephone service continues, with more and more customers doing their own direct distance dialing, the number of operator-customer contacts diminishes. A great many customers will have most of their operator contacts with information operators. This places much of the responsibility for creating a pleasing company image on the information operators.

Thus, in addition to making every effort to give a friendly, helpful, and definitely pleasing tone of service, it seems appropriate to examine some of the ways of giving a more complete and satisfying type of information service to our customers. Therefore, trials are being conducted in six cities, with the objective of:

Improving the speed of answer to a grade equivalent to outward toll.

Improving and adding to the records available to operators.

Extending the scope of search and improving the handling of special types of calls.

Developing the use of judgment and flexibility in the operating force.

Determining customer opinion of Information service by surveys made both before and after trial.

Speed Mail, the Postal Department's electronic system for sending mail great distances within seconds, entered the space age recently when a letter was transmitted from Washington, D. C., to Newark, New Jersey, via the Echo I balloon. The letter was sent first over telephone lines from Washington to a transmitting facility of the United States Naval Research Laboratory at Stump Neck, Maryland, and from there bounced off Echo to Bell Laboratories space communications center in Holmdel, New Jersey. The letter traveled from Holmdel to the Newark Post Office over regular telephone circuits.

The letter was fed into machines for scanning and reading and sent from Washington as an electronic facsimile to the Newark Post Office where it was converted into a duplicate of the original. Only machines actually "saw" the letter—the original was destroyed automatically after transmission—assuring the privacy of the mail.

On January 16, Long Lines filed with the FCC a tariff providing for a new type of interstate private line service called Telpak. This new service is designed to compete with private microwave systems in serving the bulk communications needs of customers.

The offering provides for the furnishing of channels of various bandwidths between specified locations for telephone, telephotograph (facsimile), teletypewriter, data transmission, remote metering, supervisory control, miscellaneous signaling and for other purposes.

A Telpak channel may be used as a single channel or may be subdivided into derived channels of lesser bandwidths through the use of channel terminals provided by the Telephone Company. Four sizes of Telpak channels are offered. These are designated Telpak A, B, C and D and are equivalent in capacity to 12, 24, 60 and 240 voice circuits, respectively. These classifications provide a range of channels which offer wide flexibility in meeting customers' needs and are consistent with the characteristics of the newer types of transmission systems. With growth and changes in our customers' needs, additional Telpak channels may be offered.

The broadening acceptance of the Teletraining Programs which are now available for Elementary, and Junior and Senior High Schools, has resulted in increased interest among the Companies in improving their administration. Because well-trained company school representatives are essential to successful program development, training material has been prepared and made available to help equip the representatives do the job.

Details of the new specially-designed cable-laying ship, which will be built to lay oceanic telephone systems in the future, were also released in mid-November. The vessel, to be the largest such ship in the world, will be equipped with laying gear designed by the Bell Laboratories for the latest and most efficient cable-handling techniques.

A New York naval architectural firm, Gibbs & Cox, designed the ship which will be built at a shipyard in Hamburg, Germany. It is expected to be completed in 1962.

Specifications call for an overall length of 512 feet, a breadth of 69 feet, and a capacity to carry some 1,800 miles of deep-sea cable. To be powered by a steam-turbo system, the ship will operate year round in most weather conditions, with a cruising speed of 15 knots. Her hull will be strengthened against ice and her cable-laying deck enclosed for work in northern waters.

The National Aeronautics and Space Administration's TIROS II weather satellite, launched November 23 at Cape Canaveral, was directed into its circular orbit by the Bell Labs-W. E. Command Guidance System.

Developed by Bell Laboratories for the Air Force's TITAN ICBM, the guidance system produced by Western Electric is now finding increased use in NASA's space programs.

TIROS II marks the second successful use of this guidance system for the TIROS satellites. Using a THOR-ABLE launch vehicle, the earlier TIROS I was sent into its almost-perfect circular orbit on April 1 this year. The TIROS II was launched with a Douglas-built DELTA vehicle. The DELTA was used previously to place NASA's ECHO I communications satellite into orbit on August 12, 1960.

Wider understanding and use of Area Codes by customers will make a major contribution to better telephone service and earnings through more efficient use of the plant network and reduction of operator work time. It is important, therefore, that every reasonable means be taken to stimulate proper Area Code usage both in dialing direct and in passing calls to operators.

Customer understanding and acceptance can be obtained to a greater degree through the use of our many customer instruction and public information media. Various Bell System groups are emphasizing a simple concept to help secure this understanding, based on a comparison of the Area Codes of the calling telephone and the called telephone.

Simply stated, it is that the Area Code of the telephone called should be dialed or given to the operator if it is different from the Area Code of the telephone being used. It should not be dialed or given if it is the same.

A recent letter outlined a trial conducted in the Amsterdam, New York toll center whereby operator long distance calls placed with Area Code increased from 4 per cent to 50 per cent in just eight weeks.

Of interest is the fact that, although this city does not have DDD, the customers, because of a well conceived publicity program, are using Area Codes very effectively.

WHO is at work on a satellite system for global telephone and TV transmission?

WHO provides the communications channels for America's missile defenses?

WHO is girdling the globe with communications for America's first man into space?

WHO tapped the sun for electric power by inventing the Solar Battery?

WHO used the moon for two-way conversations across the country?

who?

WHO guided Tiros and Echo into accurate orbit?

WHO made your pocket radio possible by inventing the Transistor?

WHO maintains the world's largest, finest industrial research facilities?

WHO supplies the most and the best telephone service in the world?

WHO has the UNIVERSAL communications organization?

THERE'S ONLY ONE ANSWER TO ALL TEN QUESTIONS

BELL TELEPHONE SYSTEM

Pioneering in outer space to improve communications on earth

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